Dell Training for Notebook Systems

Welcome

This course introduces Dell notebooks. Based on the current Dell offering, it describes the feature and components and the use of the Basic Input Output System (BIOS) program.

After completing this course, you will be able to:

- Describe the features and components of Dell Notebooks
- Define and utilize the BIOS program
- Implement troubleshooting processes for Dell Notebooks
- Utilize the available diagnostic tools

Course Contents

The following modules comprise this course:

1. Introduction: Provides an overview of course navigation and contents and the safety guidelines to prevent Electrostatic Discharge (ESD).

2. Dell Latitude Chassis Awareness: Describes the components of the various models of Dell Latitude Notebooks. Topics include:
- Dell Latitude D and E Series, Precision, and Vostro chassis awareness
- Dell Latitude XT/XT2 chassis awareness

3. BIOS Overview: Describes BIOS and the System Setup Utility. Topics include:
- Where BIOS is stored
- BIOS types and entering the BIOS
- BIOS security policies and level security
- BIOS passwords and security information

4. Troubleshooting: Describes the troubleshooting process, including:
- Troubleshooting power and POST issues
- Troubleshooting Latitude XT/XT2 hardware
- Troubleshooting display issues

5. Diagnostic Tools: Describes the diagnostic process and the tools available.

6. Assessment: Provides an opportunity for you to demonstrate your mastery of the course objectives.To receive credit for this course, your must pass the exit assessment with a score of 80% or higher.

7. Conclusion: Identifies the next steps for continuing your training.

Additional Information

- This course should take 2 hours to complete (excluding the assessment).

- Depending on your firewall, if you leave the course before completing you will either be given the option to return to the beginning of the course or to go back to where you left the course.

- If you would like to go straight to the assessment you can. Choose the menu icon in the lower-left corner of the screen. Once the menu is open, choose "Module 5" on the right side.

- For additional technical information, refer to support.dell.com.

Safety Guidelines

You must take precautions to prevent electrostatic discharge (ESD).

**Static Electricity –** A charge stored in any body

Electrostatic Discharge –A sudden transfer of electrostatic charge between bodies at different electrostatic potential – usually as a spark as the bodies approach one another

ESD is a major concern when handling components, especially expansion cards and system boards. Very slight charges can damage circuits. Damage from ESD can occur immediately or it may not become apparent for some time. ESD may also result in intermittent problems or a shortened product lifespan. You can minimize the chances of a discharge by wearing the wrist -grounding strap:

- While the system is plugged into the Earth circuit via the power socket, attach the wrist -grounding strap to your wrist and clip the other end to a ground object. If a wrist-grounding strap is not available, you can discharge the static electricity in your body by touching an unpainted metal surface, such as the computer chassis.
- Unplug the system.

Static-sensitive components arrive wrapped in anti-static packing material. Do the following when handling static-sensitive components:

- Use an ESD wrist-grounding strap.
- Handle all sensitive components in a static-safe area.
- If possible, use anti-static floor mats and workbench pads.
- When unpacking a static-sensitive component, do not remove the component from the anti -static packing material until you are ready to install the component into your system.
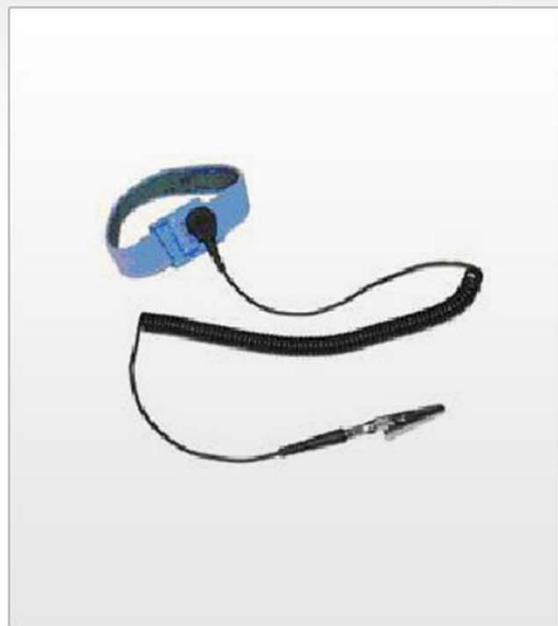
Dell Latitude D and E Series, Precision and Vostro Chassis Awareness

Learning Objectives

This module explores the features of the Dell Notebook chassis.

After completing this topic, you will be able to identify the features of the Dell Latitude D and E Series, Precision, and Vostro Chassis.

The Dell Notebook Chassis

Our discussion specifically covers the Latitude chassis: The range of chassis has undergone significant changes in its appearance especially between the D and E Series.

Confirm the chassis you are working on before you start to troubleshoot. Subtle differences among chassis may complicate the troubleshooting process. Refer to the system-specific documentation to verify the chassis type and for specific instructions for removing and replacing components with that chassis.

Note: The Precision and Vostro chassis share many features with the Latitude chassis. These features may be physically rearranged, but their functions remain the same.

The following are the significant differences of the chassis of the Dell notebook from the desktop range:

- Portability
- Design
- Materials
- Technology
- Access to hardware components

Types of Components

The components of a Dell notebook are classified into two types: Customer Replaceable Units (CRUs), and Field Replaceable Units (FRUs).

Note: Component classification of CRU or FRU depends on the system you are troubleshooting. This classification is a fairly accurate indicator as to which tasks are easily and intuitively completed versus those that require the skill and knowledge of a trained engineer. Always check the online service manual to reconcile the work required with the type of work you are comfortable completing.

Field Replaceable Units (FRUs)

- These are deemed replacement through the services of an onsite engineer.

- Typically, FRUs include the system board, the video card, the audio card, the Network Interface Card (NIC), the touchpad and the Liquid Chrystal Display (LCD). In most cases the components mentioned are integrated into the system board.

- FRUs also include internal memory, if applicable.

Customer Replaceable Units (CRUs)

- These can be easily accessed, removed or substituted without compromising the integrity of the system. Exceptions to this would include internal system memory and any internal or non-removable drive, if applicable.

- CRUs include the keyboard, hard drive, memory modules, mini-OC cards, Bluetooth cards, modem daughter card, coin-cell battery, main battery, modular drives, external drives, and the AC adapter.

Components of a Dell Notebook Chassis

The components of a Dell notebook chassis include, but are not limited to:

- Display Assembly
- Keyboard Bezel
- Keyboard
- Palm Rest
- Thermal Cooling Assembly
- Main Battery
- Bottom Plastics
- Speakers
- Hard Drive
- Optical Drive
- PCMCIA Card Slot
- System Board
- Smart Card Slot
- Microprocessor
- Fan

*Click the **Forward** arrow to see and learn more about the different views of the Latitude notebook (D630c shown).*

Components of a Dell Notebook Chassis

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- Hard Drive
- Optical Drive
- PCMCIA Card Slot
- System Board
- Smart Card Slot
- Microprocessor
- Fan

*Click the **Forward** arrow to see and learn more about the different views of the Latitude notebook (D630c shown).*

Front View:
1. Ambient light sensor
2. Keyboard LEDs / audio controls
3. Status LEDs
4. Internal microphone
5. Touchpad
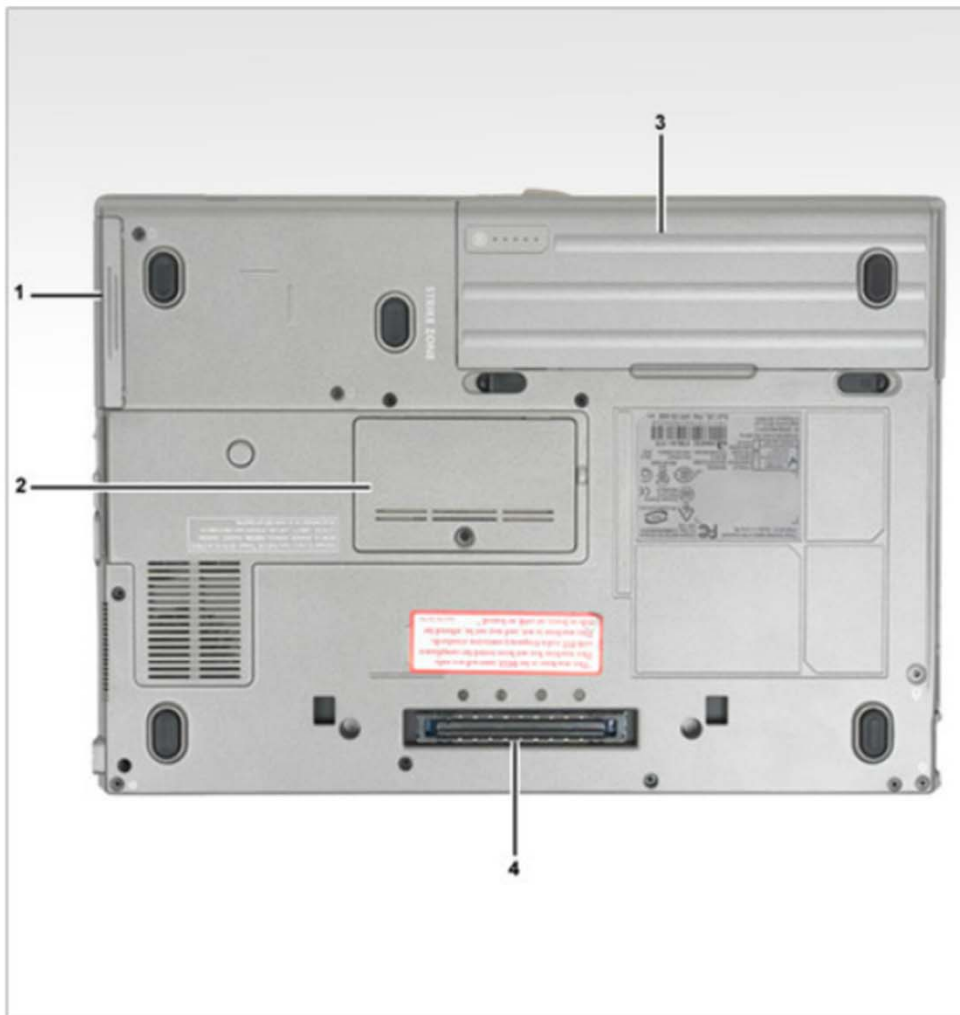
Components of a Dell Notebook Chassis

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- Hard Drive
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- PCMCIA Card Slot
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- Fan

Click the Forward arrow to see and learn more about the different views of the Latitude notebook (D630c shown).

Top View

Components of a Dell Notebook Chassis

The components of a Dell notebook chassis include, but are not limited to:

- Display Assembly
- Keyboard Bezel
- Keyboard
- Palm Rest
- Thermal Cooling Assembly
- Main Battery
- Bottom Plastics
- Speakers
- Hard Drive
- Optical Drive
- PCMCIA Card Slot
- System Board
- Smart Card Slot
- Microprocessor
- Fan

*Click the **Forward** arrow to see and learn more about the different views of the Latitude notebook (D630c shown).*

Bottom View:
1. Hard drive
2. Memory module cover
3. Battery
4. D/Dock connector

Components of a Dell Notebook Chassis

1 2 3 4 5 6

The components of a Dell notebook chassis include, but are not limited to:

- Display Assembly
- Keyboard Bezel
- Keyboard
- Palm Rest
- Thermal Cooling Assembly
- Main Battery
- Bottom Plastics
- Speakers
- Hard Drive
- Optical Drive
- PCMCIA Card Slot
- System Board
- Smart Card Slot
- Microprocessor
- Fan

Click the Forward arrow to see and learn more about the different views of the Latitude notebook (D630c shown).

Bottom View:
1. Hard drive
2. Memory module cover
3. Battery
4. D/Dock connector

Rear View:
1. RJ-45 (network) connector
2. RJ-11 (modem) connector
3. USB connectors (2)
4. Serial connector
5. Video connector
6. AC adapter connector

Components of a Dell Notebook Chassis

The components of a Dell notebook chassis include, but are not limited to:

- Display Assembly
- Keyboard Bezel
- Keyboard
- Palm Rest
- Thermal Cooling Assembly
- Main Battery
- Bottom Plastics
- Speakers
- Hard Drive
- Optical Drive
- PCMCIA Card Slot
- System Board
- Smart Card Slot
- Microprocessor
- Fan

*Click the **Forward** arrow to see and learn more about the different views of the Latitude notebook (D630c shown).*

Right Side View:
1. Optical drive
2. USB connectors (2)

Components of a Dell Notebook Chassis

The components of a Dell notebook chassis include, but are not limited to:

- Display Assembly
- Keyboard Bezel
- Keyboard
- Palm Rest
- Thermal Cooling Assembly
- Main Battery
- Bottom Plastics
- Speakers
- Hard Drive
- Optical Drive
- PCMCIA Card Slot
- System Board
- Smart Card Slot
- Microprocessor
- Fan

Click the Forward arrow to see and learn more about the different views of the Latitude notebook (D630c shown).

Right Side View:
1. Optical drive
2. USB connectors (2)

Left Side View:
1. Security cable slot
2. Audio connectors
3. Smart card reader
4. IEEE 1394 connector
5. Wireless switch
6. PC Card™ slot

Components of a Dell Notebook Chassis

The components of a Dell notebook chassis include, but are not limited to:

- Display Assembly
- Keyboard Bezel
- Keyboard
- Palm Rest
- Thermal Cooling Assembly
- Main Battery
- Bottom Plastics
- Speakers
- Hard Drive
- Optical Drive
- PCMCIA Card Slot
- System Board
- Smart Card Slot
- Microprocessor
- Fan

Click the Forward arrow to see and learn more about the different views of the Latitude notebook (D630c shown).

Note: The location of the components on the images presented, while generally applicable, is system specific and has been used purely for instructional purposes. Refer to the system-specific online documentation for information relevant to the notebook you are troubleshooting.

Key Components That Can Be Removed or Replaced

Because key components can be so easily removed, the task of eliminating or isolating offending parts is both an efficient and an intuitive process.

Note: Components' locations may vary by system. Refer to the system-specific documentation for your system.

*Click the **Forward** arrow to learn some of the key components of a Dell notebook chassis that can be removed or replaced.*
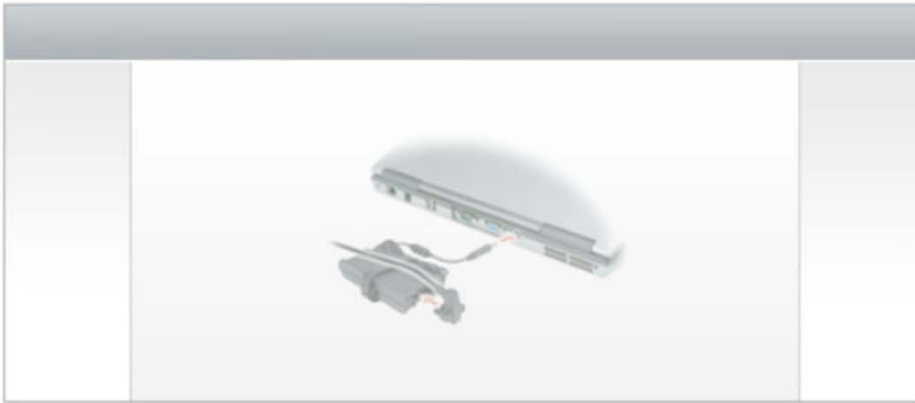
AC adapter:
- Dell AC adapters should have a status light on the "brick" that will remain solid when plugged into power, but disconnected from the system, to indicate it is in working condition.

Battery:
- With the ability to check the charge

Key Components That Can Be Removed or Replaced

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Click the **Forward** *arrow to learn some of the key components of a Dell notebook chassis that can be removed or replaced.*

Coin-cell Battery:
- The coin-cell battery on Latitude D630, D631, and D630c systems is located under the keyboard. It may be difficult to remove the battery, as it is placed in a recessed location. Gently pry open the plastic that covers the battery to gain access.

Memory:
- Most systems will have memory located on the bottom of the system under a server door, or under the keyboard, or both.

Key Components That Can Be Removed or Replaced

Because key components can be so easily removed, the task of eliminating or isolating offending parts is both an efficient and an intuitive process.
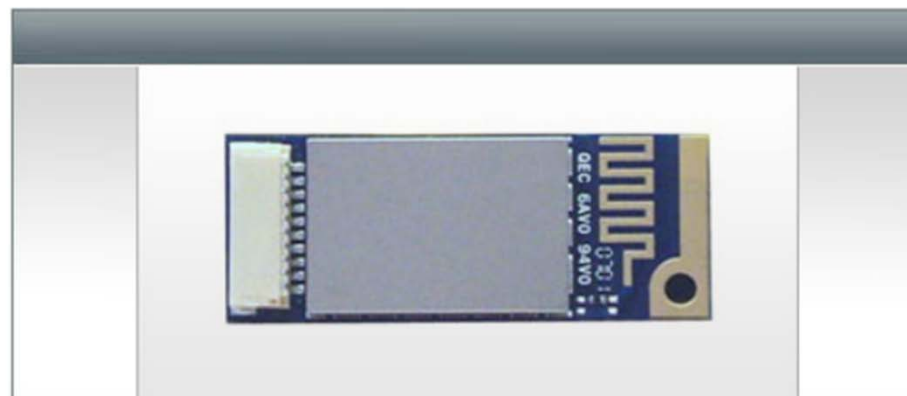
Note: Components' locations may vary by system. Refer to the system-specific documentation for your system.

*Click the **Forward** arrow to learn some of the key components of a Dell notebook chassis that can be removed or replaced.*

Keyboard:
- Most systems require that you remove the hinge cover (keyboard bezel) and then remove 2 screws in order to slide the keyboard out.

Bluetooth daughter card:
- The card location can vary, please reference the system service manual.

Key Components That Can Be Removed or Replaced

Because key components can be so easily removed, the task of eliminating or isolating offending parts is both an efficient and an intuitive process.

Note: Components' locations may vary by system. Refer to the system-specific documentation for your system.

Click the Forward arrow to learn some of the key components of a Dell notebook chassis that can be removed or replaced.

Expansion card (Smart Card, PCMCIA, Express Card):
- Options available will vary based on system model. Cards will slide in and out of the system chassis. See documentation for specific installation methods.

Mini-PC card, if applicable:
- Generally located on the bottom of the system under a service door, or under the keyboard depending on the system model.

Key Components That Can Be Removed or Replaced

Because key components can be so easily removed, the task of eliminating or isolating offending parts is both an efficient and an intuitive process.

Note: Components' locations may vary by system. Refer to the system-specific documentation for your system.

Click the **Forward** *arrow to learn some of the key components of a Dell notebook chassis that can be removed or replaced.*

Hard drive:
- Many systems will have hard drives that can be removed by sliding them out of the side of the chassis after removing the securing screws. See system service manual for instructions.

Modular drives:
- Modular drives are usually optical drives, but can also include floppy drives, hard drives and secondary batteries.

Serviceability and Maintainability of the Dell Latitude D and E Series, Precision, and Vostro Chassis

Before you attempt to service, maintain, or troubleshoot Dell notebooks you should perform the following steps:

1. Identify the system and chassis type. Model information usually appears above the keyboard. You can use the model or the service tag to find detailed information about the system on support.dell.com.

2. Refer to the online and system-specific manual for step-by-step instruction. The only tool you will require when troubleshooting a Dell notebook is a small   Phillips -head screwdriver.

# Significance of the Keyboard Bezel

Notebooks include a component called the keyboard bezel. The bezel is essentially a thin plastic strip. Removing the keyboard bezel facilitates checking for certain anomalies, which is invaluable from a diagnostic perspective.

The keyboard bezel:

- May house the diagnostic LEDs
- Facilitates checking the LCD-system board connection and the integrity of the power button contact with the system board (older systems may connect with a cable)

The Diagnostic LEDs that provide relevant troubleshooting information, like no POST issues, are also referred to as the "lock lights."

The Precision and Latitude notebooks may differ from each other in the location of diagnostic LEDs. You should always refer to the system-specific online documentation to acquaint yourself with the features of the notebook you are troubleshooting.
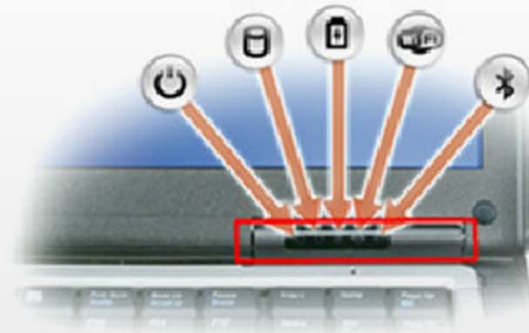
Dell Latitude XT/XT2 Chassis Awareness

Learning Objectives

The Latitude XT/XT2 is Dell's first entry into the tablet PC space. The Latitude XT/XT2 ushered in a new era of mobile computing, with the inclusion of integrated pen support, Multiple Gesture touch screen support, digital ink input, handwriting recognition technologies, and innovative hardware.

After completing this topic, you will be able to identify the features of the Dell Latitude XT/XT2 Chassis.

Product Design

The Latitude XT/XT2 is designed to function both as a convertible notebook with a screen that can swivel 360 degrees, and as a "slate" design, which lies flat like a paper notebook. Since the "slate" mode is the primary usage model, the Latitude XT/XT2 is based on an ultra-light architecture and component set that reduces form and weight and maximizes run-time.
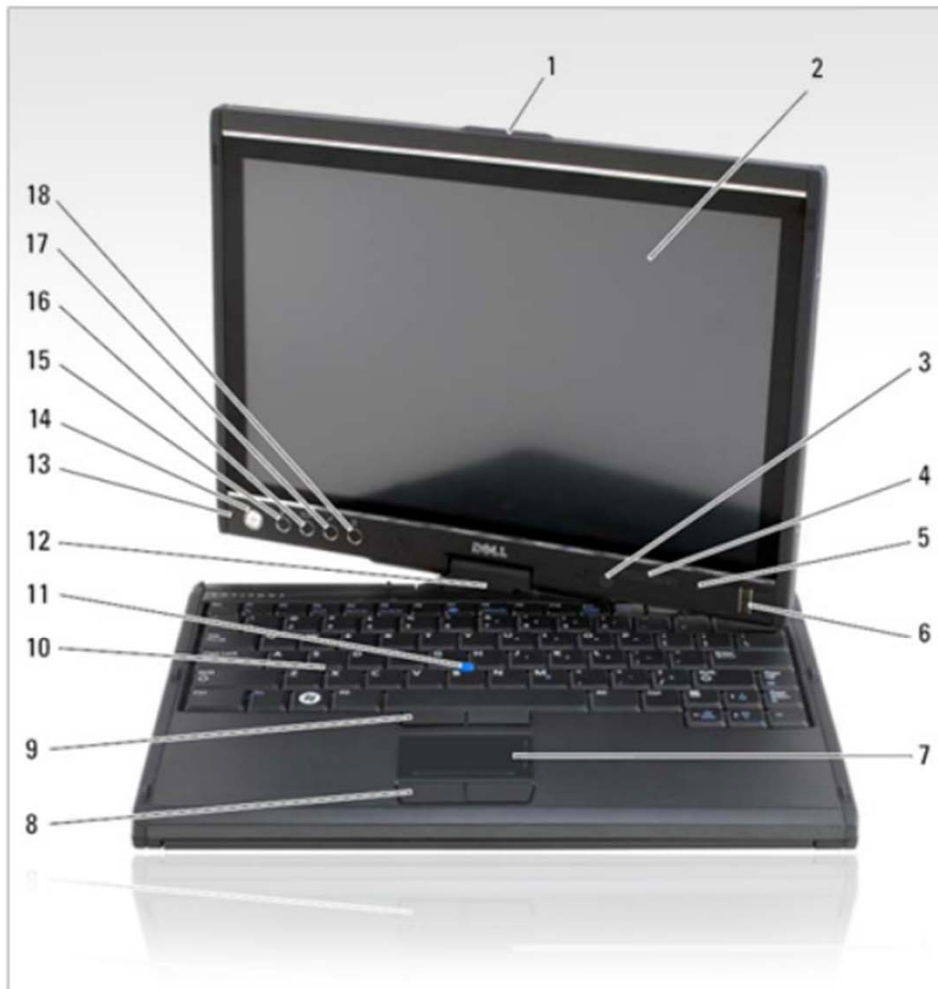
Click the **Forward** *arrow to learn the key benefits and view the product features.*

Key Benefits:
Some of the key benefits are:

- Size and weight
- Dual mode (pen-and-touch) capability
- Structural integrity
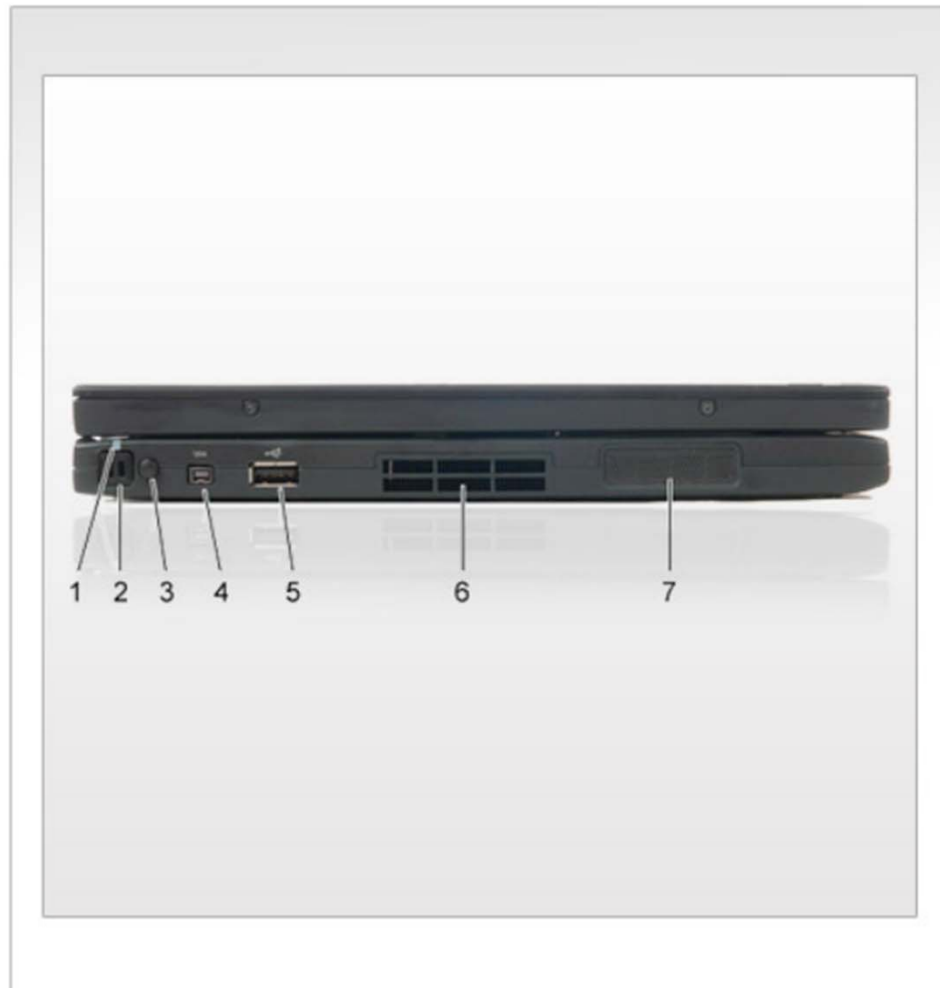- Usability (with focus on "slate" mode)
- Performance

Product Design

The Latitude XT/XT2 is designed to function both as a convertible notebook with a screen that can swivel 360 degrees, and as a "slate" design, which lies flat like a paper notebook. Since the "slate" mode is the primary usage model, the Latitude XT/XT2 is based on an ultra-light architecture and component set that reduces form and weight and maximizes run-time.

Click the Forward arrow to learn the key benefits and view the product features.

Chassis Front:
1. Display grip
2. Display
3. Ambient light sensor (with Dual-bulb CCFL LCD option only)
4. Device status lights
5. Digital array microphone (with Dual-bulb CCFL LCD option only)
6. Biometric reader
7. Touchpad
8. Touchpad buttons
9. Track stick buttons
10. Keyboard
11. Track stick
12. Rotating hinge
13. Digital array microphone
14. Power button
15. Windows Security button
16. Screen rotate button
17. QuickSet tablet settings button
18. E-mail application shortcut button

Product Design

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*Click the **Forward** arrow to learn the key benefits and view the product features.*

Chassis Left:
1. Pen indicator LED
2. Pen
3. External wireless WAN antenna
4. IEEE 1394 connector
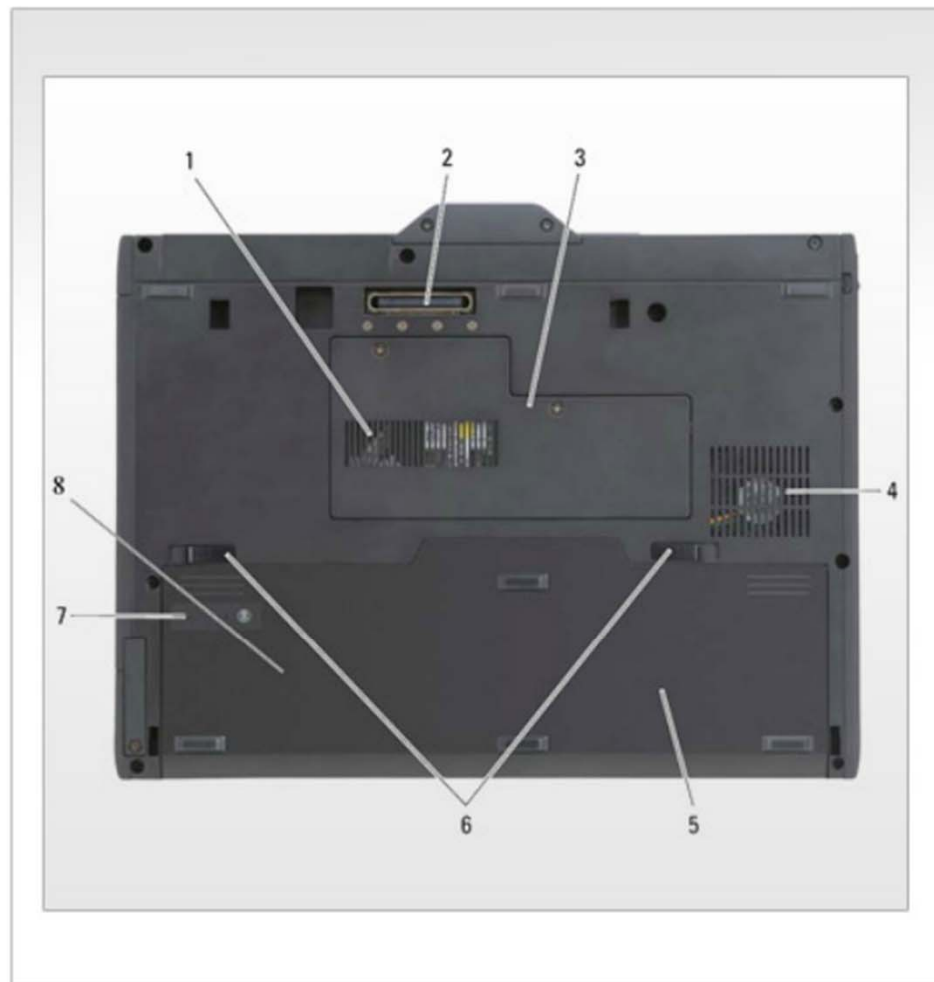5. USB connector
6. Air vent
7. Speaker

Product Design

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Click the **Forward** *arrow to learn the key benefits and view the product features.*

Chassis Right:
1. Wireless radio on/off switch
2. Wi-Fi Catcher™ button
3. USB connector
4. Secure Digital (SD™) card slot
5. ExpressCard slot
6. Headphones connector
7. Microphone connector
8. Security cable slot

Product Design

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Click the Forward arrow to learn the key benefits and view the product features.

Chassis Rear:
1. AC adapter connector
2. VGA connector
3. Tablet back button
4. Scroll control button
5. Network connector
6. Powered USB connector
7. Rotating hinge
8. Tablet grip
9. Pen tether slot

Chassis Bottom:
1. Air vent
2. Slice connector
3. Memory module and mini-card cover
4. Fan
5. Main battery
6. Battery-bay latch releases (2)
7. Battery charge gauge/health gauge
8. COA (in the battery well)

Key Components

Because Dell Latitude XT/XT2s derive from Latitude notebooks, they share many chassis features with their predecessors. However there are some differences, which include:

Redesigned LCD – The hinged-up LCD enables the Latitude XT/XT2 to work as a slate or as a traditional notebook by rotating the LCD.

Wireless – The chassis has undergone several changes related to wireless functionality. These changes include adding two buttons and moving the antenna.

Media base and battery slice – The media base and battery slice are present on some slim-line notebooks, and are optional on Dell Latitude XT/XT2s.

Changes - New Slate Design

The new hinge-up LCD design enables Latitude XT/XT2s to operate in two modes:

- **Notebook –** with the LCD oriented as on a traditional notebook
- **Slate –** with the LCD folded flat against the chassis and using the LCD as the primary input device

Click each image below to learn more about the two modes of operation.

Open the display of the Tablet PC until it reaches a 90-degree angle, perpendicular to the base.

Brace the base with one hand on the palm rest, grasp the top of the display with the other hand, and, following the directional arrow inscribed on the hinge cover, turn the rotating hinge clockwise 180 degrees until you feel the display engage securely.

Lay the display assembly on the base with the display facing upwards.

Changes in Key Components from Prior Notebook Chassis

Several components have been moved from the chassis to the LCD to support slate operation. These include:

- Power button
- Diagnostic LEDs
- Battery LEDs
- Device status indicators

Please review the following on the image:

1. Power button
2. Windows Security button
3. Screen rotate button
4. QuickSet tablet settings button
5. E-mail application shortcut button

Recent wireless hardware innovations have also been incorporated into the Latitude XT/XT2:

- The wireless switch replaces the **<FN><F2>** key sequence.
- The Wi-Fi Catcher seeks out and connects to new wireless networks.
- The WWAN antenna has been moved out of the LCD and is not a discrete component.

Key Components That Can Be Removed or Replaced

As with Dell desktop and notebook computers, Latitude XT/XT2 components fall into one of two categories. Click each image below to learn about the two categories.

Note: Components that are Customer Replaceable Units on one system may be Field Replaceable Units on another. Always check your system's system-specific documentation to be sure.

Customer Replaceable Units (CRUs)	Field Replaceable Units (FRUs)

These can be easily accessed, removed, or substituted without compromising system integrity. Examples include:

- AC adapter
- Battery
- Bluetooth card
- Electrostatic pen
- Express cards
- Wireless radio antenna

These are parts typically replaced by a service technician. Examples include:

- Ambient light sensor
- Audio card
- Biometric reader
- LCD
- Processor
- System board
- Touchpad
- Video card

Review (1 of 2)

Review the summary of this module before taking the self-check to see how well you mastered the topic.

The Precision and Vostro chassis share many features with the Latitude **chassis**. Although their freatures can be physically rearranged, their functions remain the same.

The **Dell notebook differs from the desktop** range in the following areas:
- Portability
- Design
- Materials
- Technology
- Access to hardware components

FRUs are replaceable through the services of an onsite engineer.

CRUs can be accessed, removed, or substituted without compromising the integrity of the system.

Before attempting to service the Dell Latitude D and E series, Precision, and Vostro chassis, you should identify the system chassis type and find detailed information on support.dell.com. The only tool you will require is a small Phillips-head screwdriver.

The **Keyboard bezel** may house the diagnostic LEDs. The Bezel also facilitates checking the LCD-system board connection and the integrity of the power button contact with the system board.

Review (2 of 2)

Key **benefits** of the Latitude XT/XT2 include:
- Size and weight
- Dual mode (pen-and-touch) capability
- Structural integrity
- Usability (with focus on "slate" mode)
- Performance

The **differences** between the Latitude XT/XT2 and its predecessors are:
- Redesigned LCD
- Wireless
- Media base and battery slice

The **hinge-up LCD** design enables two modes of operation, notebook and slate.

Several components have been moved from the chassis to the LCD to support **slate operation**.

Self-Check 1

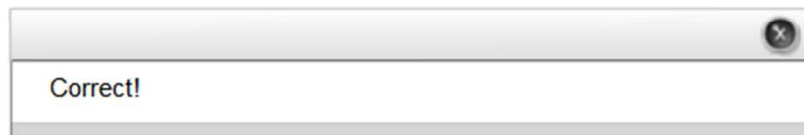Self-Check questions are similar to the questions that appear on the Exit Assessment for this course. If you do well on these Self-Check questions, you should be able to achieve a score of 80% or higher on the Exit Assessment.

True or False: You do not require tools to open the Dell notebook chassis.

Make your selection, and click **DONE** when you are finished.

(A) True

(B) False

Correct!

Self-Check 2

Which of the following components are deemed as CRUs on most Dell notebook systems? Check all that apply.

Make your selections, and click **DONE** when you are finished.

(A)   Keyboard

(B)   Hard drive

(C)   Main battery

(D)   Processor

Correct!

BIOS Overview

Learning Objectives

BIOS stands for Basic Input Output System. The BIOS is essentially a low-level software program hardcoded into an onboard CMOS (Complementary Metal Oxide Semiconductor) chip.

After completing this topic, you will be able to:

- Navigate the System Setup Utility
- Identify the types of BIOS
- Enter the BIOS
- Explain BIOS security policies and levels
- Describe BIOS password types and the securtity information required to clear BIOS passwords

Overview
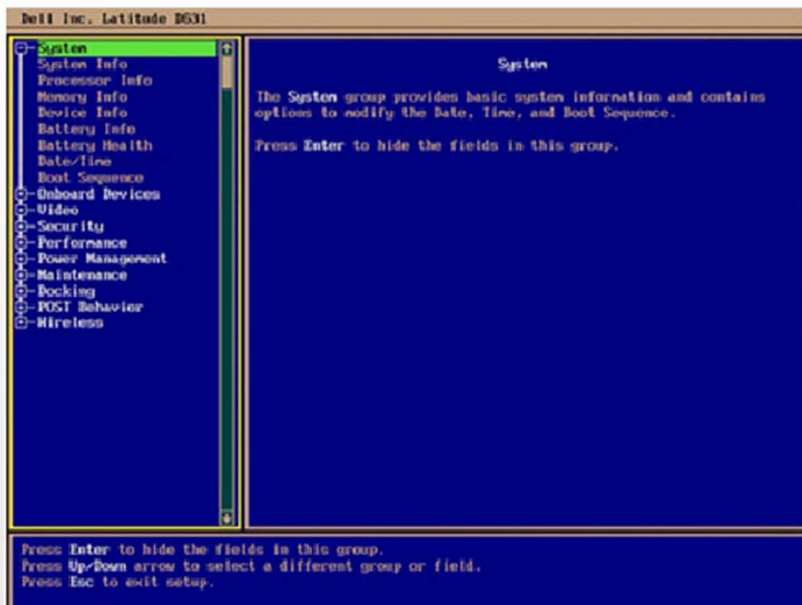
The BIOS code facilitates testing and initializing hardware, primarily the keyboard, monitor, disk drives, communication ports, memory, chipset, and processor, all of which are required to boot the system.

The BIOS also provides a user interface, usually called the System Setup Utility (SSU). You can use the SSU to:

- Verify that devices are detected
- Determine whether devices are enabled or disabled
- Change the settings for power management, processor performance, video performance, and so on

Some devices, such as Redundant Array of Inexpensive Disks (RAID) controllers and video cards, may have their own BIOS.

Note: The BIOS is unique to the system or device for which it is written. Latitude E-Series systems are the first to have a graphical SSU with mouse and touchpad support.

Navigating the System Setup Utility (SSU)

You can access the SSU by:

- Pressing **<F2>** at the Dell splash screen
- Selecting **System Setup** on the one-time boot (**<F12>**) menu

The SSU presents BIOS information and settings in a tree hierarchy. Although the interface is similar to Windows Explorer, it does not accept mouse input. The following table explains how to navigate the SSU. The options available are essentially the same for all Dell notebooks.

Action	Keystroke(s)
Expand or collapse a field	, , , Left Arrow, Right Arrow
Exit	
Change a setting	Left Arrow, Right Arrow
Select a field	
Cancel a change	
Reset defaults	or choose Load Defaults from the Maintenance menu

BIOS Storage Location
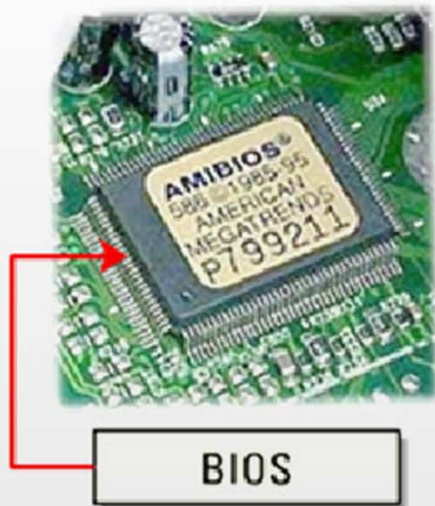
BIOS

Since the BIOS is stored in the Programmable Read-Only Memory (PROM) on a Complementary Metal Oxide Semiconductor (CMOS) chip, it is often called PROM BIOS. Isolating the BIOS from other components makes it very difficult to accidently overwrite or lose the information.

Because PROM is volatile, a small battery supplies continuous power to the CMOS chip, ensuring that the BIOS is always available and cannot be damaged by power or disk failures. When the battery is nearing the end of its life, you may notice that the BIOS settings revert to the factory defaults when the system is powered down. Date and time reversions are usually most evident.

PROM BIOS contains the code that allows a computer to boot.

Note: Many computer manufacturers design systems so that the BIOS is copied from Random Operating Memory (ROM) to Random Access Memory (RAM) each time the computer is booted. This is known as "shadow BIOS ROM," "Shadow Memory," and "Shadow RAM." The objective is to allow the computer to access that information quickly.

Types of BIOS

The PROM on which the BIOS resides is electronically erasable, giving us the term Electrically Erasable Programmable Read-Only Memory (EEPROM).

Since the BIOS is stored in EEPROM, it can be updated. Another term for a BIOS stored on an EEPROM is Flash BIOS. Updating such a BIOS is commonly called flashing the BIOS.

A BIOS that works with the operating system to accommodate plug-and-play (PnP) devices is known as a PnP BIOS or a PnP-aware BIOS.

Caution: The BIOS should never be flashed on battery power. Flashing the BIOS without sufficient power can permanently damage the system board. The notebook power supply should always be connected to the system before attempting to flash the BIOS.

Note: You should maintain the BIOS at the most current version. Check the installation instructions on support.dell.com located on the BIOS download pages.

Entering the BIOS

To enter the BIOS setup, you can perform any one of the following steps:

- Press the **<F2>** key when prompted at start-up.
- Press the **<F12>** key at start-up to access the one-time boot menu.

Warning: Changing advanced parameters can lead to system instability and data loss. It is highly recommended that you back up your hard drive contents before making any changes, and that you proceed with caution, making every reasonable effort to fully understand the implications of the settings.

BIOS Security

Click each image below to learn more about BIOS security.

BIOS Security Policies	BIOS Level Security	Types of Passwords	BIOS Security Information

- Dell Latitude notebooks provide BIOS password protection to prevent unauthorized use.
- Types of password protection and levels of protection vary depending on the user's configuration.
- Customers can clear or override their Dell notebook BIOS passwords through the Dell Helpdesk, once ownership is verified. Dell can generate a master password, which can be used to override the Dell notebook BIOS password for that specific system.

BIOS Security

Click each image below to learn more about BIOS security.

BIOS Security Policies	BIOS Level Security	Types of Passwords	BIOS Security Information
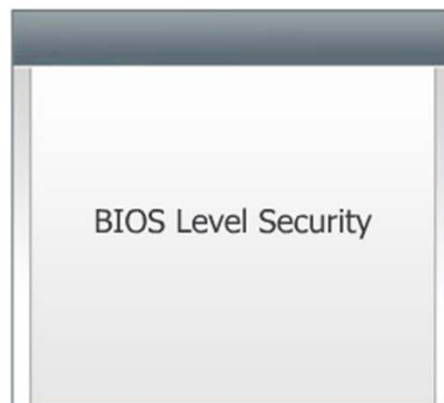
Types of master passwords that a user can set in the BIOS of a Dell notebook are:

- Primary
- Administrator
- Hard drive

Setting BIOS passwords is designed to prevent unauthorized use of the computer.

Note: Only hard drives purchased from Dell for use with Dell systems support hard drive passwords.

BIOS Security

Click each image below to learn more about BIOS security.

BIOS Security Policies	BIOS Level Security	Types of Passwords	BIOS Security Information

Primary password:
- Prevents a user from booting to any media. A password prompt appears as soon as the system is switched on. **Example:** The computer system #CXD1601-D35B, is protected by a password authentication system. You cannot access the data on this computer without the correct password.

Administrator password:
- Allows a user to boot the operating system and use the system but prevents them from making any changes in the BIOS.

Hard drive password:
- Required to unlock data on the hard drive if the system completes the Power-On Self Test (POST) and indicates that data is locked. Note that the hard drive password is stored on the hard disk drive circuitry. This means that putting the drive in another system will cause a password prompt to appear on that system. **Example:** Hard-disk #QkrPD3513-595B, the system Primary HDD, is protected by a password authentication system. You cannot access data on this hard drive without the correct password.

The easiest way to identify which type of password needs to be cleared, if one has been set, is to determine what password prompt is presented, or if you can access the BIOS, to check to see which is enabled.

BIOS Security

Click each image below to learn more about BIOS security.

| BIOS Security Policies | BIOS Level Security | Types of Passwords | BIOS Security Information |

Information required to clear BIOS passwords includes:

- Service tag or the notebook ID
- Hash encrypted serial number listed on the password prompt screen
- Type of password needed
- Proof of ownership, that is, a faxed or mailed letterhead with the request (requirements for proof of ownership are region specific)

Note: Due to the value Dell places on our customers' privacy and security, Dell will not provide a BIOS or hard drive password unless ownership of the Dell system has been properly verified.

Review

Review the summary of this module before taking the self-check to see how well you mastered the topic.

The Basic Input Output System (**BIOS**) is a low-level software program hardcoded into an onboard Complementary Metal Oxide Semiconductor (**CMOS**) chip.

The BIOS code facilitates **testing and initializing** hardware and provides a user interface called the System Setup Utility (**SSU**).

You can access the SSU by pressing **<F2>** at the Dell splash screen or by selecting **System Setup** on the on-time boot menu. BIOS information and settings are presented in a tree hierarchy.

BIOS is stored in the Programmable Read-Only Memory (PROM) on a CMOS chip and is called **PROM BIOS**.

Date and time reversions are a common indicator that the battery that supplies continuous power to the CMOS chip is failing.

Shadow Memory allows the computer to access the PROM BIOS information quickly.

Always **flash the BIOS** with the power supply connected to ensure sufficient power. Using battery power alone can cause permanent damage to the system board.

When entering the BIOS, be aware that **changing advanced parameters** can lead to system instability and data loss.

Primary, Administrator, and Hard drive passwords can be used for BIOS security. Primary, Administrator, and Hard drive passwords can be used for BIOS security. If ownership and the system information can be verified, Dell can assist in overwritting or removing any set passwords. The hard drive passwords will only work on Dell branded drives designed for the system being used.

Self-Check 1

True or False: The BIOS controls the initial part of the BOOT process.

Make your selection, and click **DONE** when you are finished.

(A) True

(B) False

Correct!

Self-Check 2

Which of the following keys is used during startup to access the one-time boot menu of the Dell computer?

Make your selection, and click **DONE** when you are finished.

(A)   <F2>

(B)   <F6>

(C)   <F8>

(D)   **<F12>**
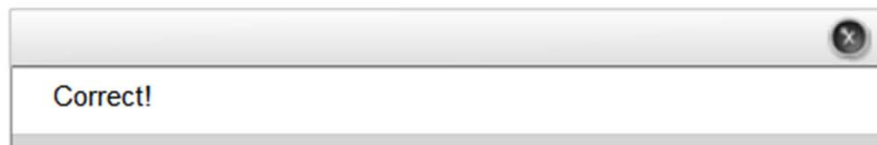
Correct!

Self-Check 3

How many passwords can a user set in the BIOS of a Dell notebook?

Make your selection, and click **DONE** when you are finished.

A   2

B   3

C   4

D   5

Correct!

Troubleshooting Power and POST Issues

Learning Objectives

After completing this topic, you will be able to:

- Identify and establish guidelines for troubleshooting power and POST-related faults in Dell Latitude, Precision, and Vostro notebooks
- Troubleshoot Latitude XT/XT2 hardware
- Troubleshoot display related issues

The POST Process

The POST process steps are:

A user powers the system on through the power button.

A signal passes through the system board to the processor.

The processor interprets the signal and in turn, signals the soft-switched power supply to power up the system.

The power supply sends an electrical current to all of its power leads.
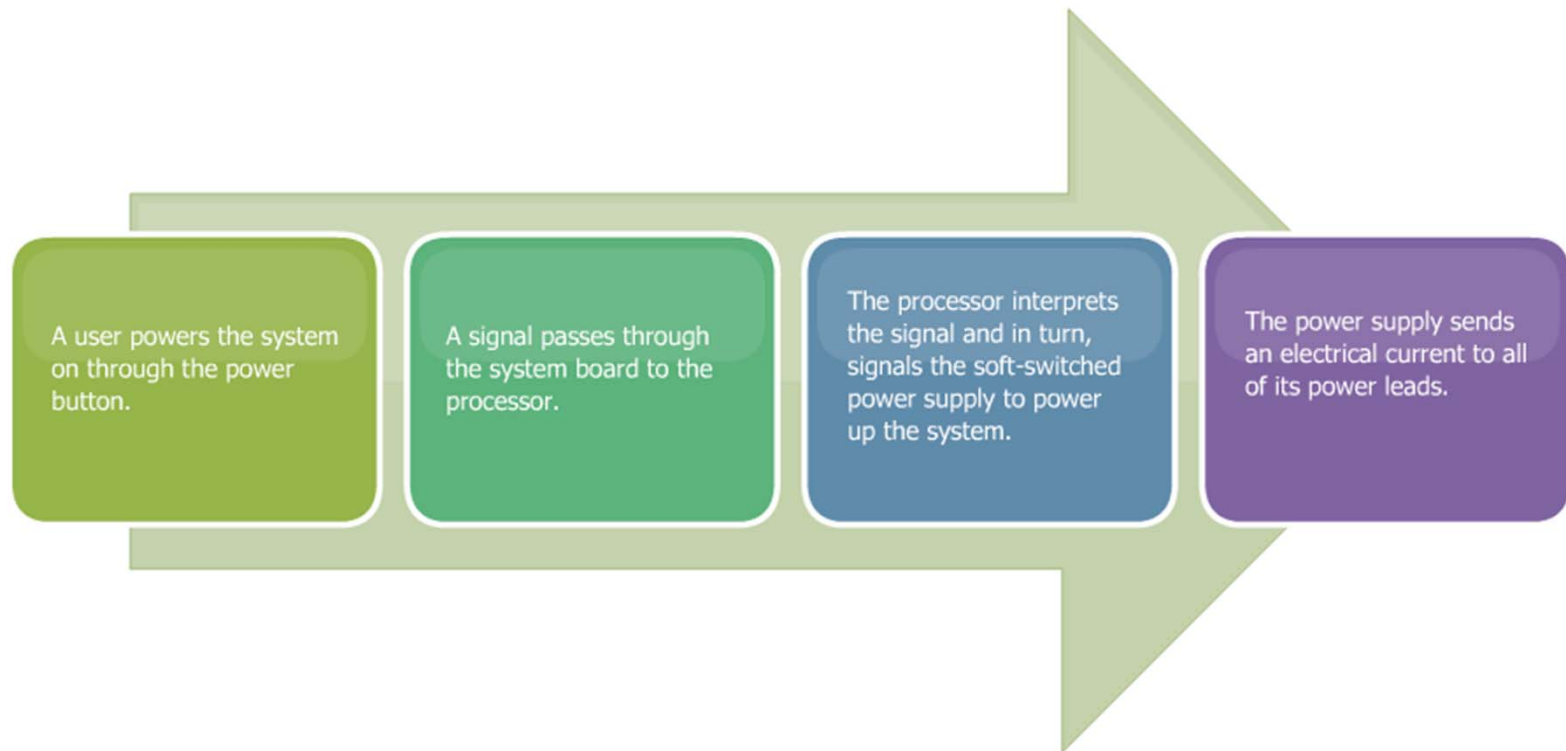
Function of the BIOS in the POST Process

In the POST process, the functions of the BIOS are:

- Initializes the core chipsets
- Checks and configures the memory
- Enables L1 and L2 caches and checks the processor
- Copies itself into the memory and passes control to the copy in memory

Note: The Extended System Configuration Data (ESCD) set stores information about Plug-and-Play devices. The BIOS and some operating systems access ESCD each time you reboot your computer. This memory is also referred to as Non-volatile RAM (NVRAM).

The BIOS runs another memory check before moving onto the keyboard test.

- The BIOS tests the keyboard, during which the LEDs should flash.
- The BIOS tests and initializes the video, which can be witnessed from the splash screen.
- The BIOS verifies the resource assignments in ESCD and reallocates resources if new hardware is found. This test may be bypassed if PnP OS is enabled. Enabling PnP OS causes resource assignments to be handled by the operating system.
- Any ROM chips such as a NIC or SCSI controller initialize and Dell Power Management starts up. The BIOS checks for a system password, and then passes control to the operating system.

Troubleshooting Power- or POST-Related Stage Failures

Before troubleshooting any power- or POST-related issues, isolate the notebook. Remove it from any docking station or port replicator. Disconnect any external power supply and check the status of the battery.

When troubleshooting a power- or POST-related stage failure on a notebook, your first task is to classify the category into which it falls. Is it a power issue or a POST issue?

Click the Forward arrow to learn the steps to answer this question.

1. Determine if the system is receiving power. Check the system power LED and the AC adapter for LED activity.

2. Check for any diagnostic LED codes. These codes are a function of the BIOS and can help determine the process that failed.

3. Determine if the system has hard locked (or "frozen") at a particular point in the process.

4. Access the "no power no POST" decision tree for the notebook you are troubleshooting in   the Dell Solution Network (DSN). DSN provides a database of support and troubleshooting   articles. You can access it through support.dell.com.

5. Remove all external devices, CRUs, and memory, replacing these components with known good parts where you can. With memory, you should test the available modules in all possible permutations.

6. If nothing appears on the LCD, test video with an external display. More elaborate strategies may include disconnecting the LCD from the system board or video card before testing with the external display.

Troubleshooting Power- or POST-Related Stage Failures

Before troubleshooting any power- or POST-related issues, isolate the notebook. Remove it from any docking station or port replicator. Disconnect any external power supply and check the status of the battery.

When troubleshooting a power- or POST-related stage failure on a notebook, your first task is to classify the category into which it falls. Is it a power issue or a POST issue?

*Click the **Forward** arrow to learn the steps to answer this question.*

Note: When employing a troubleshooting methodology, your first goal is to identify the symptoms of the failure and then investigate according to the principles of cause and effect. This helps to isolate suspect components.

To elaborate - if you remove, reseat or substitute a component (cause) and the symptoms change in any way (effect), then you can assume that you have potentially isolated or "touched" on the faulty components. This is why your approach to troubleshooting should be incremental and carried out in discrete phases. After each step, recheck the available troubleshooting indications such as LED codes. Proceed to the next action if the condition persists.

LCD Error Messages during POST

Error messages may appear on the LCD during POST to notify you of a possible problem with a system. The following are sample error messages. Please check the system-specific documentation for error messages appropriate for the chassis that you are troubleshooting.

- Address mark not found
- Alert! Previous attempts at booting this system have failed at checkpoint [nnnn]. For help in resolving this problem, please note this checkpoint and contact Dell Technical Support.
- Attachment failed to respond
- Bad error-correction code (ECC) on disk read
- Controller has failed
- Data error
- Decreasing available memory

Note: Error messages will only appear after the LCD has been initialized. If the LCD is initialized, this is an indication that the base system is working properly.

Power LED States

The first step in troubleshooting any failed system process is to determine the stage at which the process failed.

To verify power, check the power LED first. The power LED for a normal working system is usually steady green (it is blue in the Latitude E-Series), although some notebooks do not illuminate the power LED after POST. If the power LED is off or blinking, press the power button and wait for a few seconds. Then note the power LED state and look for system activity to determine if the notebook is hibernating or in standby mode. If the system is hibernating, the LED may be off, or it may blink. Pressing the power button should cause the notebook to "wake up" and resume where you left off.

D Series	E Series	Battery

If the D series system is connected to an electrical outlet, the battery light operates as follows:

- Solid Green - The battery is charging

- Flashing Green - The battery is almost fully charged

If the E Series system is connected to an electrical outlet, the battery light operates as follows:

- Blue light off - Battery in full charge mode with AC adapter present

- Blue light on - Battery in charge mode with AC adapter present

If the system is running on a battery, the battery light operates as follows:

- Off - The battery is adequately charged (or the system is turned off)

- Flashing Orange - The battery charge is low

- Solid Orange - The battery charge is critically low

Settings for power management can be configured in the BIOS.

Troubleshooting the AC Adapter

After checking the power LED, check the AC adapter. The AC adapter usually consists of two pieces: a power cord and the transformer, which is colloquially called the "brick." Some AC adapters combine both of these components into a single unit.

Higher wattage AC adapters are often required when using docking stations or port replicators. A 90W adapter is usually required. Please check your system specifications for more information.

*Click the **Forward** arrow to learn the troubleshooting steps.*

1. Disconnect the AC adapter from the notebook and the power source.

2. Verify the power source with another electrical device.

3. Reseat the power cord that attaches to the adapter. Swap it with a known good cord, if possible.

4. With the adapter still disconnected from the notebook, plug the AC adapter directly into a wall outlet and wait for the LED on the AC adapter to stabilize.

5. Check the AC adapter LED for a steady state. If the LED is steady green/blue, the AC adapter is working correctly. If the LED blinks or does not appear, replace the AC adapter.

6. Remove the battery from the notebook. If the battery has a self-test, determine its charge state.

7. With the battery out of the notebook, test the notebook with a known good AC adapter. If the AC adapter LED changes from solid green/blue to off or starts blinking only when connected to the system, the charger board on the system board is probably faulty. This condition necessitates replacing the system board.

Troubleshooting the AC Adapter

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Higher wattage AC adapters are often required when using docking stations or port replicators. A 90W adapter is usually required. Please check your system specifications for more information.

Click the Forward arrow to learn the troubleshooting steps.

Note: The adapter cables should not be wrapped around the brick. If the connector on the adapter plugs into the notebook, it could fray or split where the connector joins the cable. Wrap only the cable in on itself. Use a "twist tie" to hold the loops together.

Make sure you are using the correct AC adapter. Using an AC Adapter with less wattage than the system recomended guidelines may result in the system being unable to POST. This will often result in an on-screen error message.

Troubleshooting the AC Adapter

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Make sure you are using the correct AC adapter. Using an AC Adapter with less wattage than the system recomended guidelines may result in the system being unable to POST. This will often result in an on-screen error message.

For the Latitude XT/XT2, the system, the battery slice, and the media base all ship with their own AC adapters.

- The 45-watt adapter that ships with the Latitude XT/XT2 cannot charge the battery slice.
- The 65-watt adapter that ships with the battery slice can power the Latitude XT/XT2.

BIOS LED Codes
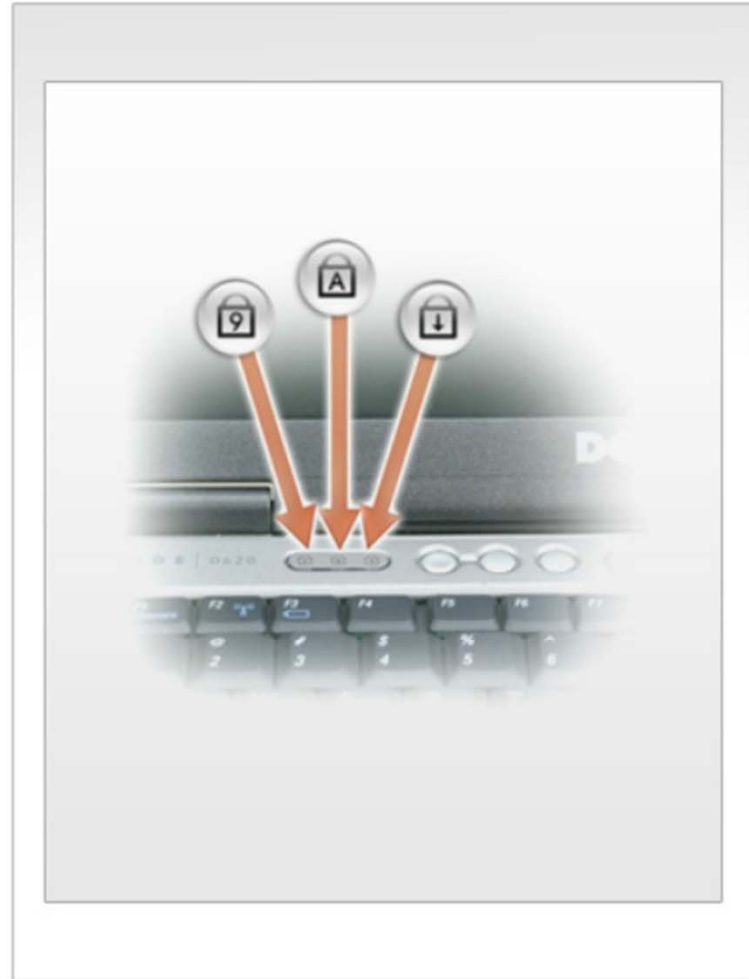
The BIOS uses LEDs to relay error code information critical to understanding POST stage failures. Read the LED codes from left to right, regardless of what the LEDs are actually labeled. The codes can differ based on the BIOS version. Always check your system's system-specific documentation.

Click the **Forward** *arrow to learn about device and keyboard status LEDs.*

BIOS LED Codes

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Click the Forward *arrow to learn about device and keyboard status LEDs.*

Device Status LEDs

One item that remains common among notebooks is what each LED represents and how errors are displayed.

- This LED turns on steadily or blinks to indicate battery charge status.

BIOS LED Codes

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Click the Forward arrow to learn about device and keyboard status LEDs.

Device Status LEDs

One item that remains common among notebooks is what each LED represents and how errors are displayed.

- This LED turns on when the computer reads or writes data.

BIOS LED Codes

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- This LED turns on steadily or blinks to indicate battery charge status.

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Click the Forward arrow to learn about device and keyboard status LEDs.

Device Status LEDs

One item that remains common among notebooks is what each LED represents and how errors are displayed.

- This LED turns on when wireless networking is enabled. To enable or disable wireless networking, press **<Fn><F2>**.

BIOS LED Codes

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Click the Forward arrow to learn about device and keyboard status LEDs.

Device Status LEDs

One item that remains common among notebooks is what each LED represents and how errors are displayed.

- This LED turns on when a card with Bluetooth® wireless technology is enabled. To turn off only the Bluetooth wireless technology function, right-click the icon in the system tray and select Disable Bluetooth Radio. To quickly enable or disable all wireless devices, press **<Fn><F2>**.

BIOS LED Codes

The BIOS uses LEDs to relay error code information critical to understanding POST stage failures. Read the LED codes from left to right, regardless of what the LEDs are actually labeled. The codes can differ based on the BIOS version. Always check your system's system-specific documentation.

Click the **Forward** *arrow to learn about device and keyboard status LEDs.*

Keyboard Status LEDs

- This LED turns on when the numeric keypad is enabled.

BIOS LED Codes

The BIOS uses LEDs to relay error code information critical to understanding POST stage failures. Read the LED codes from left to right, regardless of what the LEDs are actually labeled. The codes can differ based on the BIOS version. Always check your system's system-specific documentation.

Click the Forward arrow to learn about device and keyboard status LEDs.

Device Status LEDs

One item that remains common among notebooks is what each LED represents and how errors are displayed.

Keyboard Status LEDs

- This LED turns on when the Caps Lock function is enabled.

BIOS LED Codes

The BIOS uses LEDs to relay error code information critical to understanding POST stage failures. Read the LED codes from left to right, regardless of what the LEDs are actually labeled. The codes can differ based on the BIOS version. Always check your system's system-specific documentation.

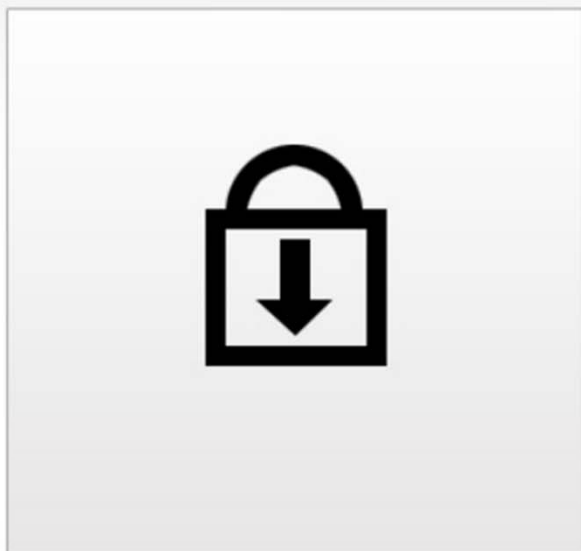*Click the Forward arrow to learn about device and keyboard status LEDs.*

Keyboard Status LEDs

- This LED turns on when the Scroll Lock function is enabled.

LED Error Codes for a No-POST Situation

The following information shows the possible LED codes that may display in a no-POST situation for the E series Latitude.

Guide:
Off - The LED is completely off
On - The LED is completely on – not flashing
Flash - The LED is flashing on and off

Example: Flash-On-Flash = The first LED is flashing, the second LED is static, and the third LED is flashing.

Click the Forward arrow to view the LED lights on the left and read their description and the next steps to follow.

LED Error Codes for a No-POST Situation

ON   OFF   OFF

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Description: No SODIMMs are installed

Next Steps:
1. Install supported memory modules.
2. If memory is already present, reseat the module(s) one at time in each slot.
3. Try known good memory from another system or replace the memory.
4. Replace the system board.

LED Error Codes for a No-POST Situation

FLASH   ON   ON

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*Click the **Forward** arrow to view the LED lights on the left and read their description and the next steps to follow.*

Description: CPU error

Next Steps:
1. Reseat the processor.
2. Replace the processor.
3. Replace the system board.

LED Error Codes for a No-POST Situation

FLASH   ON   FLASH

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Guide:
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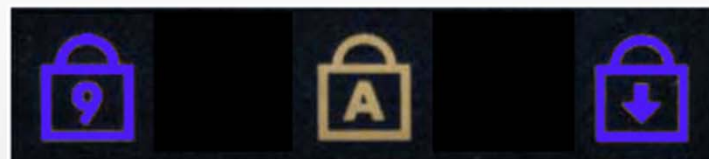**Example:** Flash-On-Flash = The first LED is flashing, the second LED is static, and the third LED is flashing.

Click the Forward arrow to view the LED lights on the left and read their description and the next steps to follow.

Description: LCD Panel Error

Next Steps:
1. Reseat the LCD cable.
2. Replace the LCD panel.
3. Replace the video card / system board.

LED Error Codes for a No-POST Situation

OFF   FLASH   OFF

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Click the Forward arrow to view the LED lights on the left and read their description and the next steps to follow.

Description: Memory compatibility error

Next Steps:
1. Install compatible memory modules.
2. If two modules are installed, remove one and test. Try the other module in the same slot and test. Test the other slot with both modules.
3. Replace the memory.
4. Replace the system board.

LED Error Codes for a No-POST Situation

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Description: Memory is detected but has errors

Next Steps:
1. Reseat the memory.
2. If two modules are installed remove one and test. Try the other module in   the same slot and test. Test the other slot with both modules.
3. Replace the memory.
4. Replace the system board.

ON   FLASH   ON

LED Error Codes for a No-POST Situation

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Description: Modem Error

Next Steps:
1. Reseat the modem.
2. Replace the modem.
3. Replace the system board.

OFF	FLASH	FLASH

LED Error Codes for a No-POST Situation

FLASH   FLASH   FLASH

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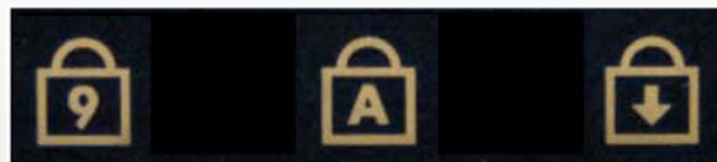**Example:** Flash-On-Flash = The first LED is flashing, the second LED is static, and the third LED is flashing.

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Description: System board error

Next Steps:
1. Replace the system board.

LED Error Codes for a No-POST Situation

FLASH   FLASH   OFF

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Description: Option ROM Error

Next Steps:
1. Reseat the device.
2. Replace the device.
3. Replace the system board.

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Description: Storage device error

Next Steps:
1. Reseat the hard drive and optical drive.
2. Test the system with just the hard drive and just the optical drive.
3. Replace the device that is causing the failure.
4. Replace the system

🔒9	🔒A	🔒↓
OFF	ON	OFF

LED Error Codes for a No-POST Situation

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Click the Forward arrow to view the LED lights on the left and read their description and the next steps to follow.

Note: If the system displays a memory-related diagnostic error code, validate the fault through testing the module/s in the possible permutations or through substitution with known good memory, if available. Additionally, if the failure mode is 0-1-1, test to see if the error code changes to 1-0-1 when the memory is completely removed. This will validate your assumptions based on the error code information received.

For example, if the error code highlights a failed memory module, test that the system can detect the correct condition without memory, thus ruling out the possibility of multiple failures. These tests, while they may appear to be an additional burden, validate your assumptions, and more importantly, ensure that the correct parts and a first-time fix are guaranteed.

Troubleshooting External Devices and CRUs

To troubleshoot external devices and CRUs, perform the following steps:

1. Power the system off.
2. Disconnect the power.
3. Remove external devices.
4. Remove CRUs.
5. Check the connector on a suspect CRU for damaged, bent, or pushed-in pins.
6. Check the socket, slot, or bay to which the CRU and/or external device connects.
7. Check that the screws on the base of the system are not loose. If they are loose, tighten them.
8. Test the system.
9. Add the CRUs and devices back one at a time.

External devices may include printers, scanners, port replicators, and docking stations. CRUs may include mini-PC cards, memory modules, hard drives, modular drives, and PCMCIA cards. CRUs vary by system, so be sure to check the system-specific documentation for your system before removing or replacing parts.

Always power the system down before handling hardware.

System Hard Locks

Click each image below to learn about system hard lock troubleshooting and unlocking.

Troubleshooting	Unlocking
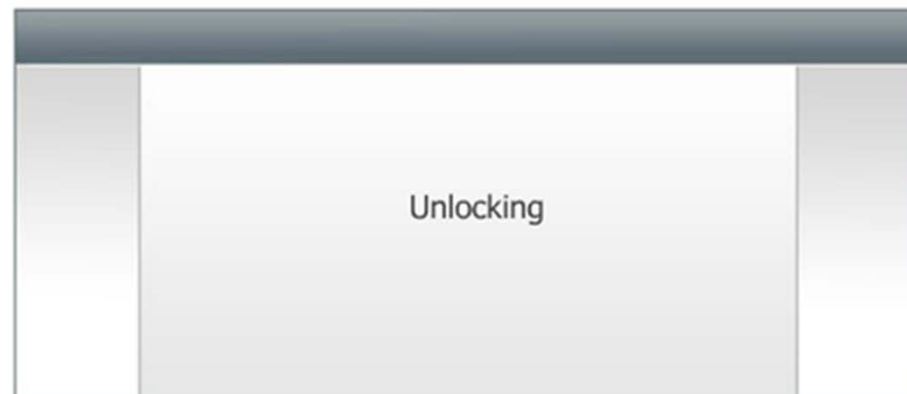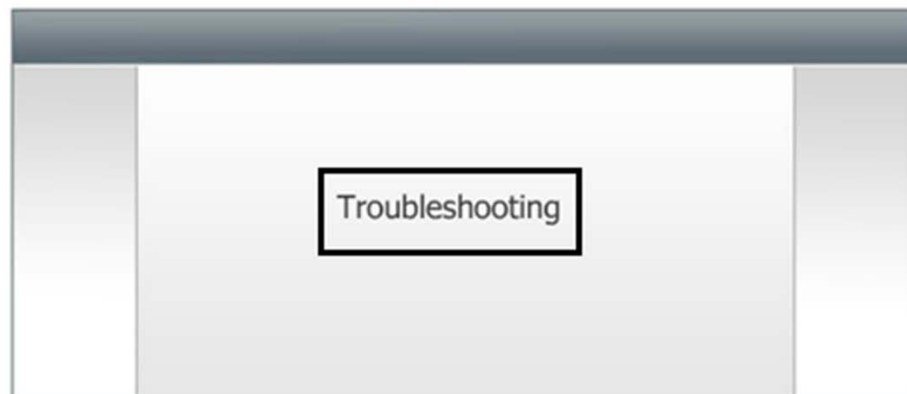
While a system hard lock often results from an issue with the operating system, devices may also cause the failure. One symptom is a system not responding to any input even though the power LED is on and solid green. Additionally, there may or may not be a display on the LCD.

Once you have identified a system lock, search for an applicable decision tree in DSN. This action cannot be overstated, as often it provides key information and/or guidance necessary to solving the issue. Search strings can include "system lock" or "system freeze."

System Hard Locks

Click each image below to learn about system hard lock troubleshooting and unlocking.

Troubleshooting	Unlocking

Perform the following steps to unlock the system:
1. Press and hold the power button for 8 to 10 seconds.
2. Remove the battery and AC power.
3. Wait for 10 seconds.
4. Reconnect AC power.
5. Press the power button.
6. Check if you can access the BIOS by pressing the **<F2>** key. If you can,   the fault may be attributed to the hard drive or the operation system.

Note: If the system locks up again, it may be because the application or operating system is corrupt, which could require a re-install. If a hardware device is responsible, troubleshoot the issue the same as with a POST failure. Try to isolate or remove the offending component and test with known good components, if applicable. With this category of failure, troubleshoot the most portable devices, like the IDE devices.

Troubleshooting Latitude XT/XT2 Hardware

Learning Objectives

After completing this topic, you will be able to troubleshoot Latitude XT/XT2 Hardware.

Digitizer

The pen is the first component to be investigated in the event of a suspected problem with the digitizer. Verify that the tip is in good shape (free of chips, excessive wear, etc.) by closely examining it. If there is any doubt, you should exchange the tip for a new one or one that is known to be in good condition.

You should also verify that the touch capabilities are not affected. Switch to touch mode and see if the problem still exists. If there are no symptoms present while in touch mode, the pen tip is the most likely suspect. If the problem does persist in touch mode, run diagnostics and take the necessary steps depending on the results.

Only the diagnostics built into the N-trig Tablet Settings applet are valid for testing the digitizer. The 32-bit and PSA+ diagnostic routines do not test the functionality of the digitizer.

Symptoms of digitizer issues include unexpected or no response to the stylus. When this happens follow these troubleshooting steps:

1. Try resetting the factory default settings in the N-trig Tablet Settings Control Panel applet.
2. Test the digitizer in touch mode.
3. Try a new stylus tip.
4. Recalibrate the digitizer.
5. Run the digitizer diagnostics.

Stylus

One of the easiest troubleshooting steps for suspected digitizer issues is to determine if the stylus is the cause. Simply switch to touch mode. If the digitizer responds to your finger but not the stylus, the stylus is the most likely cause of the issues.

Calibrating stylus input should be one of your first steps in troubleshooting digitizer issues. To calibrate the stylus:

1. Open the **QuickSet** utility.
2. On the **System** menu, click **Tablet Settings**.
3. On the **Tablet Settings** dialog, click the **Pen & Input** tab.
4. Click **Calibrate**.
5. Follow the instructions on the screen.

Note: Be sure to calibrate the stylus in both portrait and landscape modes.

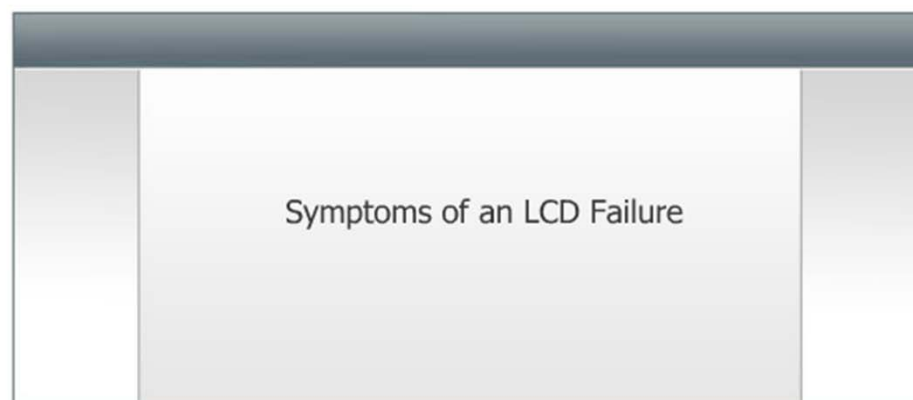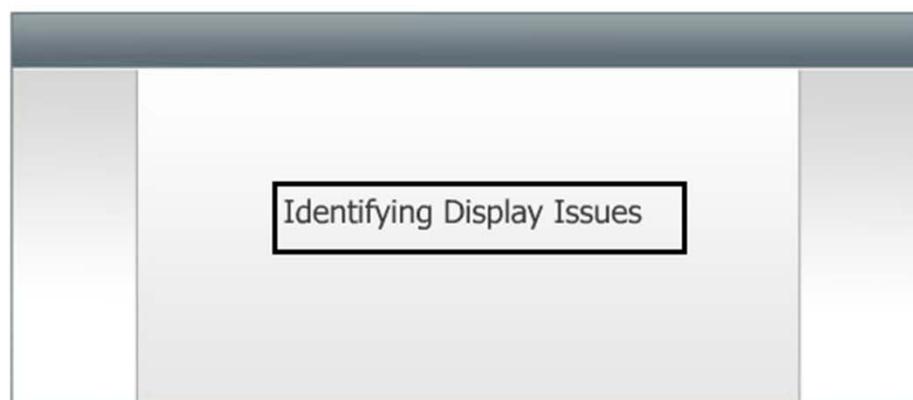# Troubleshooting Display Issues

Learning Objectives

After completing this topic, you will be able to troubleshoot display issues.

Identification and Symptoms

Click each image below to learn about identifying display issues and the symptoms of an LCD failure.

Identifying Display Issues	Symptoms of an LCD Failure

To troubleshoot display issues, you need to categorize the fault and identify the components responsible for the fault. Display issues could be due to any of the following:

POST-related video failure:
- This type of failure is typically identified during the POST routine and while the BIOS is initializing the video adapter. Note that the LCD panel would not have been tested at this point. It would be an easy mistake to confuse the failure of the video adapter with a failed LCD panel due to the absence of a display. This highlights the importance of classifying the category failure correctly.

LCD failure:
- An LCD panel failure refers specifically to the panel or the LCD flex cable that is connected to the system board.

Identification and Symptoms

Click each image below to learn about identifying display issues and the symptoms of an LCD failure.

Identifying Display Issues	Symptoms of an LCD Failure
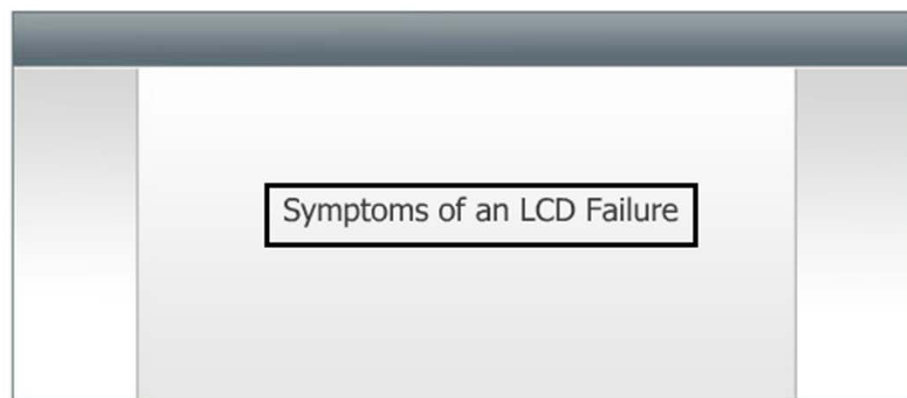
Certain symptoms indicate failure of the video adapter, LCD, or the connection between the LCD and video adapter:
- The Caps Lock, Num Lock, and Scroll Lock LEDs respond to their respective keys even though the video is not functioning.
- You can hear Windows start-up sounds or noises while booting but the LCD remains blank.
- The display appears jittery or distorted and possibly flickers, when turning on and off.

If these symptoms persist with a known-good external display, you can be fairly confident that the problem lies with the video adapter or the connection between the video adapter and the system board. If the symptoms improve with a known good external display, the fault is probably with the LCD or the connection.

Troubleshooting

Click the Forward arrow to learn the methods to use to troubleshoot display-related issues.

Physically manipulating the hardware
- Reseat the LCD connection. This is done by removing the keyboard bezel and manipulating the connector.
- Check for possible signs of damage to the cable or connector.
- Consult your online system manual for step-by-step instructions and information.

Testing through diagnostic software
- You need to run the PSA diagnostic for any display-related issue that affects a notebook. The diagnostic will in turn initiate the Built-in Self Test (BIST). The BIST runs independently from the LCD inverter and excludes the rest of the system. The inverter is replaceable on E series systems. If the BIST shows test patterns, the LCD is likely functional and the issue lies elsewhere. The results of these diagnostic tests need to be included in your online warranty request.

Changing configuration settings
- If the LCD exhibits extremely dim video, you can adjust the brightness or connect to AC power. This can help identify a power management setting in the BIOS or simply a setting that was adjusted.
- Most Dell notebooks will increase brightness by pressing **<FN><Up Arrow>**.

Using an external display or flat panel
- You can quickly eliminate the variables involved in a display issue by connecting an external monitor or flat panel. This test is suited to those symptoms which are affected by movement. When testing with an external display, you may need to leave the LCD disconnected.

Testing in safe mode
- If the video is distorted or displaying lines on both the LCD and the external monitor, the fault could be either software or hardware related. You need to update the video driver and test the system in safe mode. If the symptoms are not visible in safe mode, it is typically a software -related fault.

Troubleshooting

Click the Forward arrow to learn the methods to use to troubleshoot display-related issues.

Testing in the BIOS or POST

- If you check the display during the POST or the system setup, and the symptoms are present outside of the operating system, it is typically a video adapter-related issue. These tests should always be attempted before submitting an online warranty request.

Reconciling dead pixels with the industry standard specification

- If the LCD has dead pixels, bear in mind that there is an industry- specified tolerance level, within which the LCD cannot be replaced. Like any Cathode Ray Tube (CRT) or flat panel replacement, Dell cannot guarantee that an LCD replacement will not have a pixel related issue. Please speak directly with your Dell representative if you are in any doubt.

Out of Warranty

Some display issues are not covered by standard warranties, including cracks in the LCD. Cracks are indicated by:

- Any spider web effect
- A puncture
- Bleeding effect
- Spots of what appears to be an ink-like substance on the screen

Review (1 of 2)

Review the summary of this module before taking the self-check to see how well you mastered the topic.

The **POST process** begins when a user powers on the system via the power button causing a signal to pass through the system board to the processor. The processor interprets the signal and in turn signals the soft-switched power supply to power up the system. At this point, the power supply sends an electrical current to the power leads.

The **functions of the BIOS in the POST process** includes initializing the core chipset, check and configure memory, enable L1 and L2 caches, check processor, and copy itself into the memory. Once you have unlocked the system, try to access the BIOS. The BIOS runs a memory check before moving onto the keyboard test.

Before **troubleshooting a POST related issue**, remove it from any docking station or port replicator. Disconnect external power and check battery status. You must first classify the failure as a power or a POST issue.

When **troubleshooting error messages**, which appear on the LCD during POST, check system-specific documentation for the chassis.

Troubleshooting any failed system process starts with determining which process failed. The **LEDs status** will help to identify the failed process. If the LEDs do not provide an answer, check the AC adapter.

Lock LEDs relay error code information critical to understanding POST stage failures. Check the system-specific documentation for code translations.

LED codes will display in a no-POST situation on Dell notebook systems. Check the system manual for information regarding your model.

Review (2 of 2)

When **troubleshooting external devices and CRUs**, always power off the system and disconnect the power.

A **system hard lock** generally results from an operating system issue, but can be caused by device failure.

When troubleshooting the Latitude XT/XT2 hardware, you should first check the pen of the **digitizer**. One of the easiest steps is to determine if the **stylus** is the cause.

When **troubleshooting display issues**, categorize the fault and identify the components responsible for the fault. Display issues can be caused by POST-related video failure or LCD failure.

Methods to troubleshoot display-related issues may include:
- Physically manipulating the hardware
- Testing through diagnostic software
- Changing configuration settings
- Using an external display or flat panel
- Testing in safe mode
- Testing in BIOS or POST
- Reconciling dead pixels with the industry standard specification

Cracks in the LCD are not covered by standard warranty.

Self-Check 1

Which of the following devices checks and configures memory in the POST process?

Make your selection, and click **DONE** when you are finished.

(A) RAM

(B) ROM

(C) BIOS

(D) ESCD

Correct!

Self-Check 2

Which of the following components does the AC adapter consist of?

Make your selections, and click **DONE** when you are finished.

(A) Power cord

(B) Socket pin

(C) Connector

(D) Brick

Correct!

Self-Check 3

Which of the following symptoms is indicative of an LCD failure?

Make your selection, and click **DONE** when you are finished.

(A) There is no power.

(B) The Caps Loc, Num Lock, and Scroll Lock LED lights respond when the Caps Lock, Num Lock, or Scroll Lock keys are pressed.

(C) The system locks up at the Dell splash screen.

(D) The system could start POST, but the BIOS could not transfer control to the operating system.

Correct!

Self-Check 4

You are troubleshooting a system that is not booting up correctly. Which of the following symptoms indicate a no POST situation?

Make your selections, and click **DONE** when you are finished.

(A) There are no operating system messages.

(B) There is no response from the keyboard.

(C) Lines are displayed on the screen.

(D) There are no startup sounds from the operating system.

(E) The system locks up at the Dell Splash screen.

Correct!

Self-Check 5

Which of the following states or actions indicate that POST was successful?

Make your selections, and click **DONE** when you are finished.

(A) The power LED is on.

(B) The keyboard status LEDs flash.

(C) Operating system messages are displayed.

(D) There are no Windows startup sounds.
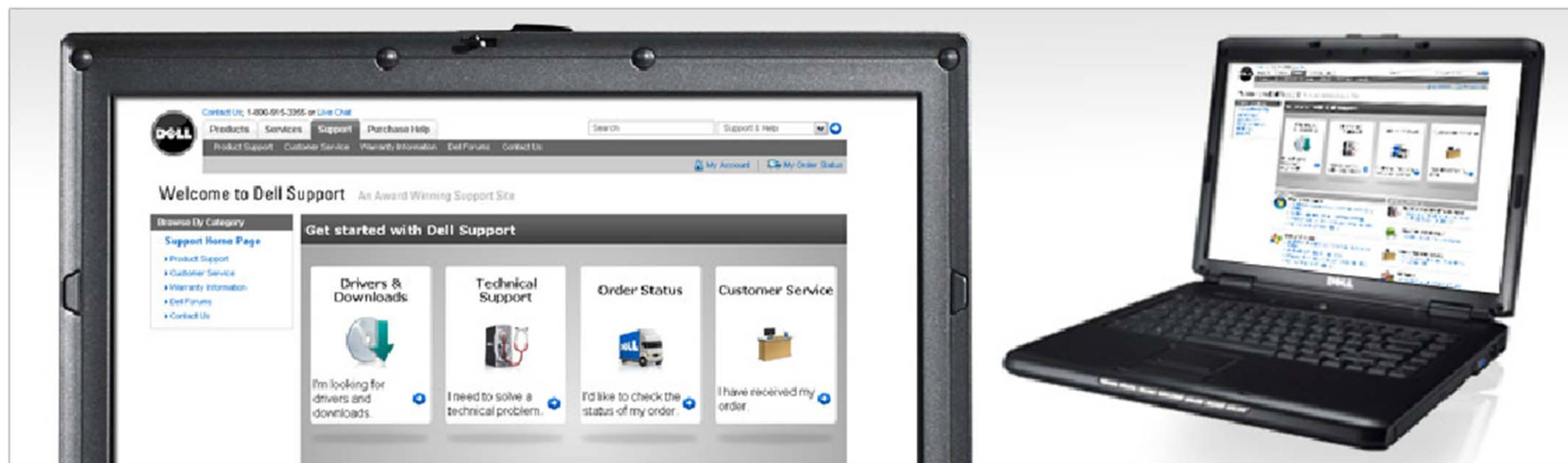
Correct!

Diagnostic Tools

Learning Objectives

After completing this topic, you will be able to identify and employ the applicable software diagnostic tools, including the relative options, for both specific and general failure events.

Obtaining Dell Diagnostics

New Dell platform releases are accompanied by a Graphic User Interface (GUI) diagnostic application, whereas older systems would ship with the DOS-based equivalent. The diagnostic application can test all major hardware components and their functions. The software is available from the following three resources:

- The Dell resource CD that comes with all platforms
- The Dell support website, support.dell.com
- The system partition, a 32 MB partition, placed on your hard drive during the manufacturing process

Note: You can access the 32 MB system partition by using the one-time boot menu. To do so, first press **<F12>** during the power-on phase to activate the one- time boot menu and then follow the prompts that appear on the screen. However, when systems are imaged, the partition is often overwritten and will not be present.

The Diagnostic Process

You can access the diagnostic application by booting the resource CD and making the appropriate selections from the displayed menu.

1. The Dell logo appears on the screen followed by a message informing you that the application is being loaded.
2. A program tests the RAM that will be used by the diagnostic tools before it is loaded into   the memory.
3. The resource CD checks the BIOS for version and setup information.
4. The diagnostic application scans the hardware present, which it then uses to ensure that   the application tests a valid configuration.

Note: The 32-bit Diagnostics serve as a useful tool when attempting either to test a specific component, or to perform a more general system health inspection. Error messages received can help pinpoint component failures, whether there is an absolute failure or the device is operating outside of normal parameters. In general, it is advisable to run the diagnostics if a user is experiencing "intermittent" or "strange" errors, system freezes, or questionable response times (vague conditions). If the diagnostics pass with no reported errors, you can shift the troubleshooting strategy towards the software environment. Importantly, the software diagnostics should always be used as an indication only. The 32-bit Diagnostics cannot be used as substitute for definitive troubleshooting or for direct hardware testing. It is imperative that all error code information reported by the 32-bit Diagnostics be included in the online service request to Dell.

Warning: Using a version of the diagnostics older than the system being tested can often result in false errors. The newest version available should always be used.

Running the Diagnostics Process

Click each image below to learn how to run the Diagnostics Process.

Diagnostics Using the Resource CD-ROM	Resource CD-ROM	Diagnostics from the System Partition
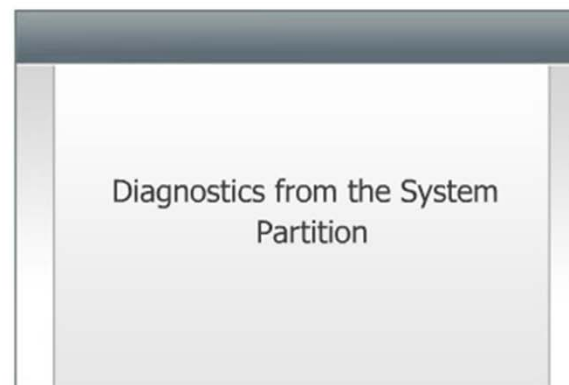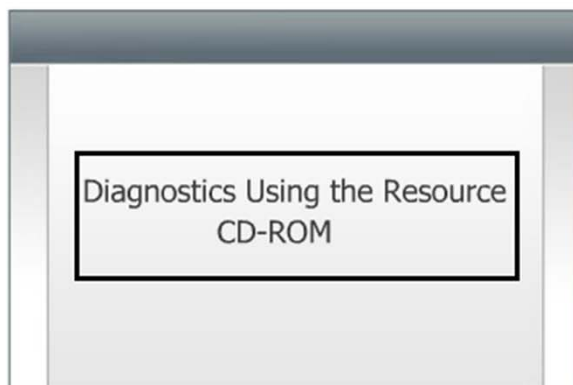
1. Boot the system with the resource CD inserted into the drive.
2. Press **<F12>** when prompted during startup, which displays the one-time boot menu.
3. To prepare the system to run diagnostics, select the **Boot** from **CD-ROM** option from the **Startup** menu by pressing **2**.
4. To begin system diagnostics, select the **Run the 32 Bit Dell Diagnostics** option from the **Choice Actions** menu by pressing **1**.

Running the Diagnostics Process

Click each image below to learn how to run the Diagnostics Process.

Diagnostics Using the Resource CD-ROM	Resource CD-ROM	Diagnostics from the System Partition
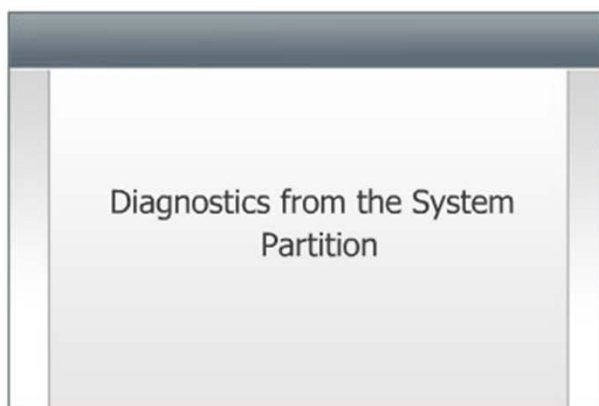
The resource CD:
- Can be used to install drivers, disk utilities, and applications (diagnostic or performance based).
- Will autorun when placed into the drive, while in the operating system.
- Can help in identifying the various chips present on your system along with their manufacturer and type.
- Can be used to run the 32-bit Diagnostics.
- Can be used as a DOS boot disk for applications, such as BIOS updates and asset.com, which will allow users to set their asset tags in the BIOS. Asset.com is located on the resource CD in the "Tools" folder.

Note: The disk information may become outdated, and it is recommended that you continually check the support site's Drivers and Downloads page for the most up-to-date drivers and/or utilities.

Running the Diagnostics Process

Click each image below to learn how to run the Diagnostics Process.

Diagnostics Using the Resource CD-ROM	Resource CD-ROM	Diagnostics from the System Partition
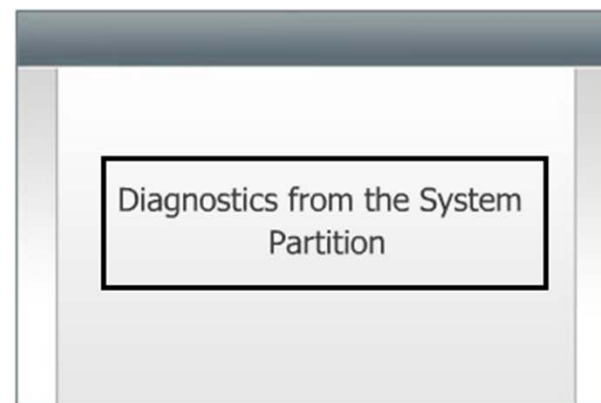
All factory-shipped Dell systems include, as part of the default specification, the 32-bit System Diagnostics, hidden on the utility partition. Perform the following steps to run the diagnostics:

1. Press the **<Ctrl><Alt><F10>** sequence or **<F12>** while the system boots to access the diagnostic tool.
   (**<Ctrl><Alt><F10>** does not work on all Dell systems. However, holding **<Fn>** while powering on will load the PSA diagnostics which will then boot to the 32-bit Diagnostics once done if the hidden partition exists.)
2. The tool loads the appropriate modules, and the standard Dell Diagnostics main menu appears.
3. When you choose to exit the diagnostic tool, the system will reboot according to the normal boot sequence and return to the installed operating system, if applicable.

Note: Hard drives sent for service replacement will be unformatted. As a result, the utility partition will not be included. The capability to run 32-bit Diagnostics will also be absent. Keystrokes pressed while the system is booting will be ignored on these drives.

Features Available in the New Diagnostic GUI

With the new diagnostic GUI utility program you can:

- Perform express, extended, or custom tests on one or all devices.
- Select tests based on the problem that your system reports.
- Choose the number of times a test is to be run.
- Display test results.
- Suspend testing if an error is detected.
- Terminate testing if the number of errors exceeds the predefined number.
- Access help that describes the tests and devices.
- Receive status messages that indicate whether tests have completed successfully.
- Receive error messages if problems are detected.

Contents of the New GUI Diagnostic Tools
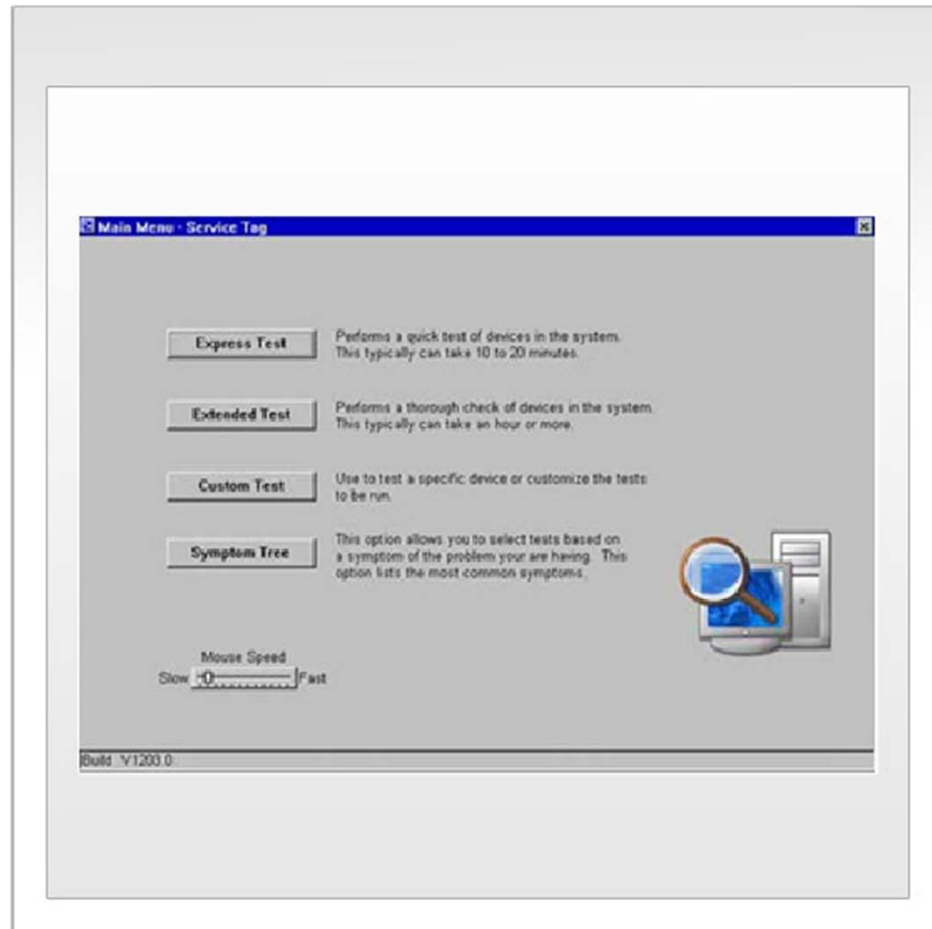
You are provided with the following four choices when you run the first screen of the new GUI diagnostic utility:

Express test:
- Runs a quick test on all components in the system.
- Finds obvious faults.
- Has an approximate run-time of 30 minutes.

Extended test:
- Runs in-depth tests on all components in the system.
- Tests components at the extremes of their parameters.

Custom test:
- Runs in-depth tests on the individual components that you select.
- Helps to tailor the tests you run. You use this option when you receive error code information highlighting a potentially faulty part or you have a suspicion based on the system's behavior that you want to validate.

Symptom tree:
- Is useful if you are not sure which component is suspected to be failing, but know the symptom that it is producing.
- Tests all hardware components that can cause a particular symptom.

Main Menu - Service Tag

Express Test	Performs a quick test of devices in the system. This typically can take 10 to 20 minutes.
Extended Test	Performs a thorough check of devices in the system. This typically can take an hour or more.
Custom Test	Use to test a specific device or customize the tests to be run.
Symptom Tree	This option allows you to select tests based on a symptom of the problem your are having. This option lists the most common symptoms.

Mouse Speed
Slow ⎯⎯0⎯⎯⎯⎯ Fast

Build V1200.0

Running Notebook On-board Diagnostics

The On-Board Diagnostics (OBD) tools consist of two system tests:
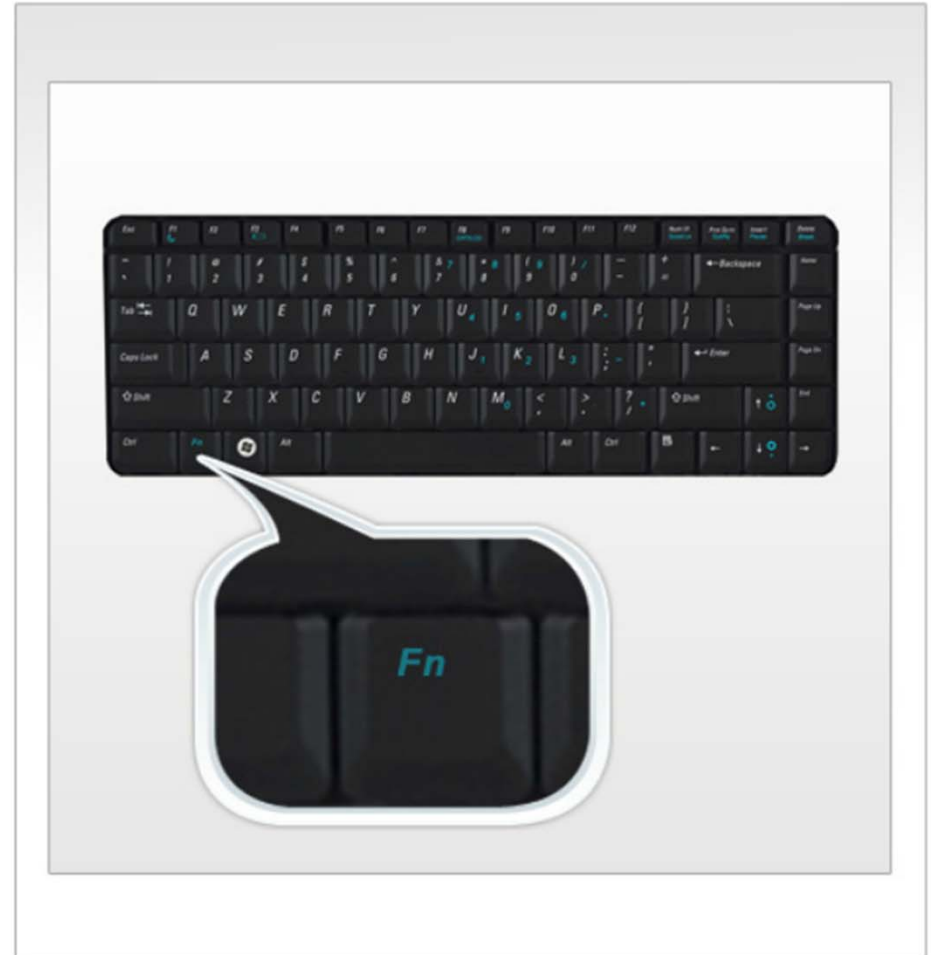- Preboot System Assessment (PSA)
- 32-bit Diagnostics

The OBD tool must be run, if possible, before replacing any hardware, unless the fault has been verified through a component substitution test. Additionally, all error code information must be referenced in the online service request.

Click the Forward arrow to learn the two methods to start the OBD.

- Press **<Fn>** or the **Access Direct** button, if available, while powering on the system.

- Choose **Diagnostics** from the **<F12>** one-time boot menu.

Note: The PSA tests are built into the BIOS while the 32-bit Diagnostics, (as in the desktop ranges) exist in the utility partition. Therefore, the resource CD can be used to run the 32-bit Diagnostics program.

After the completion of the PSA process, the user will be asked to run Dell Diagnostics, which will complete as it would in the 32-bit Desktop Diagnostics, if the utility partition has not been overwritten.

The Preboot System Assessment

Error Code	Error Message
1000-0111	(Name of Exception) exception occurred at selector XXh offset XXh.
1000-0122	Memory test initialization failure.
10000-0123	Memory integration test failed.
1000-0141	No drive detected.
1000-0142	Drive Self Test failed. Status byte = XXh.
1000-0143	Drive Smart read command failed.
1000-0144	No support for Drive Self Test
1000-0145	Timeout waiting for Drive Self Test to complete.
1000-0146	DST Log contains previous error(s).

The Preboot System Assessment (PSA) is a system test that is available in the OBD tools. It is an integrated low-level hardware diagnostic designed to run before the 32-bit Diagnostics. The results of the PSA are written into an Electrically Erasable Programmable Read-Only Memory (EEPROM) on the system board. If the system clears the PSA, it will continue to perform the 32-bit Diagnostics. If the diagnostic tools are not located on the hard drive partition, the system will prompt the user to insert the resource CD. This will restart the system and the diagnostics will run from the resource CD.

*Click the **Forward** arrow to learn what hardware devices have low-level tests run by the PSA.*

- System board

- Keyboard controller

- Hard drive controller

- LCD

- Memory

If a test fails, the PSA issues a beep code and/or on-screen error code. Error codes can be looked up in the Quick View diagnostic accompaniment, and must be referenced in the online service request.

This image is a sample of the PSA error codes.

PSA+ Diagnostics

PSA+ Diagnostics is a newer version of the PSA Diagnostics utility.

It is not available on all systems due to space limitations on the BIOS chip. Systems that do not have enough space on the chip will use the standard PSA Diagnostics.

Aside from changes in the look and feel, there are some other differences between the PSA+ and the original PSA Diagnostics.

*Click the **Forward** arrow to learn about the differences.*

Version Numbering
PSA+ Diagnostics has version numbers starting with 4, as in 4xxx. The standard PSA Diagnostics has version numbers starting with 3, as in 3xxx.

Error Numbering
PSA+ Diagnostics has error codes starting with a 2, as in 2000-xxxx. The original version has error messages starting with 1, as in 1000-xxxx.

Initial Touchpad Check
PSA+ Diagnostics incorporates a touchpad check when launched, whereas the standard PSA Diagnostics version does not.

MpMemory Algorithms
One of the most important feature enhancements for the PSA+ Diagnostics is the inclusion of MpMemory algorithms for enhanced testing of system memory. These algorithms are not present in the standard version. The algorithms provide a much more reliable means of testing the memory. These tests are able to catch some of the memory errors that the 32-bit Diagnostics tests do not.

- MpMemory Algorithms provide DIMM isolation to identify which module is failing.
- There are more tests to choose from.
- This feature avoids the 4 GB limit and can test up to 64 GB.

PSA+ Diagnostics

PSA+ Diagnostics is a newer version of the PSA Diagnostics utility.

It is not available on all systems due to space limitations on the BIOS chip. Systems that do not have enough space on the chip will use the standard PSA Diagnostics.

Aside from changes in the look and feel, there are some other differences between the PSA+ and the original PSA Diagnostics.

Click the Forward arrow to learn about the differences.

Machine Check Exception Always On

PSA+ Diagnostics has the Machine Check Exception feature on, which aids in troubleshooting processor problems. This feature does not exist in the standard version. The purpose of this tool is to separate processor problems from memory problems. This is especially true when detecting bad cache on the processor. On older systems, if bad cache is detected, the keyboard lock lights indicate a memory error. This situation can result in an incorrect dispatch of memory instead of a more appropriate processor replacement.

System Board Tests Consolidated

The original PSA Diagnostics list the various system board tests separately. In the PSA+ Diagnostics, these are all now combined under one heading.

There are two ways to launch this utility:
- Hold down the **<FN>** key while pressing the **power** button to turn on the system.
- Press **<F12>** at the welcome screen for the one-time boot menu, then select **Diagnostics** from the list.

The LCD BIST

The PSA introduced a new test for LCDs known as LCD Built in Self Test (BIST).

*Click the **Forward** arrow to learn about the LCD BIST.*

- It is only available if the platform supports it.

- While running this test, the LCD is operating on its own, free of the video controller, which may be discrete (a video card) or onboard (on the system board). The test allows you to differentiate an LCD panel problem from a problem with the controller. If colors are displayed across the screen without any trouble, then the problem lies outside the LCD. However, if the colors are not displayed or the screen does not display even one solid color, then the problem is only with the LCD.

- The BIST begins during the PSA test if the system prompts a graphics test error (0334 or 0333) and the user presses Y to continue testing. During the LCD BIST, a solid screen is shown and five different colors are displayed. While colors are displayed, the system beeps every two seconds and the lock lights (Num Lock, Caps Lock, and Scroll Lock) illuminate to indicate that the test is running. This can be used to determine if something is wrong with the display.

The Dell Crash Analysis Tool

The Dell Crash Analysis Tool is designed to search for software and driver versions installed on the system to identify any known conflicts.

*Click the **Forward** arrow to learn about the Dell Crash Analysis Tool capabilities.*

- Can identify driver and software problems on Dell systems

- Can be used if a customer gets blue screen errors, lockups in the operating system, or random reboots

- Lists potential device drivers that could be the root cause of the issue

- Can be downloaded from ftp.us.dell.com/app/r107879.exe

- Can be installed and run on any stem, once downloaded

- Includes a viewer

Note: If the Dell Crash Analysis Tool discovers a fault with any of the device drivers, it can save a potential OS reinstall.

The key principle upon which the tool is based is that driver-related issues need to be addressed before unnecessary hardware dispatches occur. In essence, if a hard drive was dispatched for a software-related issue it would appear to resolve the problem, at least for the immediate future. However, chances are good that the problem would only manifest itself further down the line, especially if a "rogue" or "malicious" driver is a requirement for essential system functionality. There is a risk that the future failure would prove even more costly.

File Download - Security Warning

Do you want to run or save this file?

Name: r107879.exe
Type: Application, 488KB
From: ftp.us.dell.com

[Run] [Save] [Cancel]

While files from the Internet can be useful, this file type can potentially harm your computer. If you do not trust the source, do not run or save this software. What's the risk?

Review (1 of 2)

Review the summary of this module before taking the self-check to see how well you mastered the topic.

The **Dell diagnostic application** can test all major hardware components and their functions. The software is available from:
- Dell resource CD
- Dell support website
- System partition

The **32-bit diagnostics** will test specific components or perform a general system health inspection.

With the new **diagnostic GUI utility program**, you can:
- Perform express, extended, or custom tests on one or all devices
- Select tests based on the problem that your system reports
- Choose the number of times a test is to be run
- Display test results
- Suspend testing if an error is detected
- Terminate testing if the number of errors exceeds the predefined number
- Access online help for descriptions of the tests and devices
- Receive status messages that indicate whether tests have completed successfully
- Receive error messages if problems are detected

The **OBD tool** consists of the Preboot System Assessment (PSA) test and the 32-bit diagnostics test. The PSA runs low-level tests on hardware devices.

Review (2 of 2)

The new **PSA+** diagnostics utility has the following changes from PSA:
- Version numbering
- Error numbering
- Initial touchpad check
- MpMemory algorithms
- Machine check exception always on
- System board tests consolidated

The PSA also introduced the **BIST**. The LCD BIST operates on own and allows you to differentiate an LCD panel problem from a problem with the controller. The BIST begins during the PSA test if the system prompts a graphics test error.

The **Dell Crash Analysis Tool** is designed to search for software and driver versions installed on the system to identify any known conflicts. If a fault is discovered with any of the device drivers, the Crash Analysis Tool can save a potential OS reinstall.

Self-Check 1

True or False: The Dell resource CD can help in identifying the chipset present on your system, but has no added value in terms of diagnosing system faults.

Make your selection, and click **DONE** when you are finished.
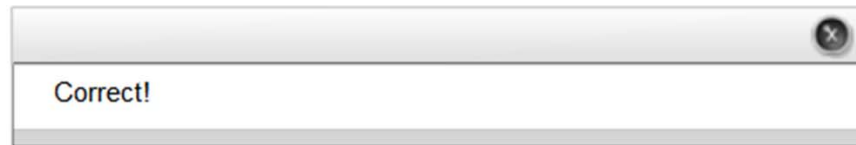
(A) True

(B) False

Correct!
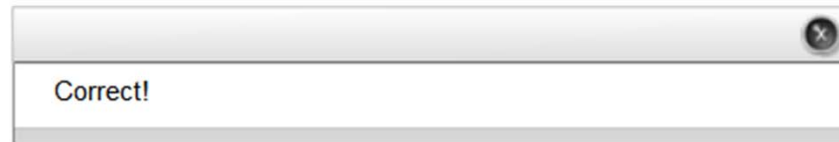
Self-Check 2

In which of the following devices does the PSA run a low-level check?

Make your selections, and click **DONE** when you are finished.

(A) Keyboard controller

(B) Printer

(C) LCD

(D) System board

Correct!

Self-Check 3

Which of the following tests run in-depth tests on all components of the system?

Make your selection, and click **DONE** when you are finished.

(A) Express test

(B) Extended test

(C) Custom test

(D) Symptom tree

Correct!

Self-Check 4

True or False: The results of the PSA are written onto the hard drive.

Make your selection, and click **DONE** when you are finished.

A   True

B   False

Correct!

Self-Check 5

True or False: The LCD BIST process begins if the user accepts to continue testing when a graphics test error is encountered.

Make your selection, and click **DONE** when you are finished.

(A) True

(B) False

Correct!